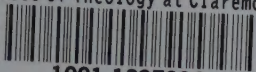


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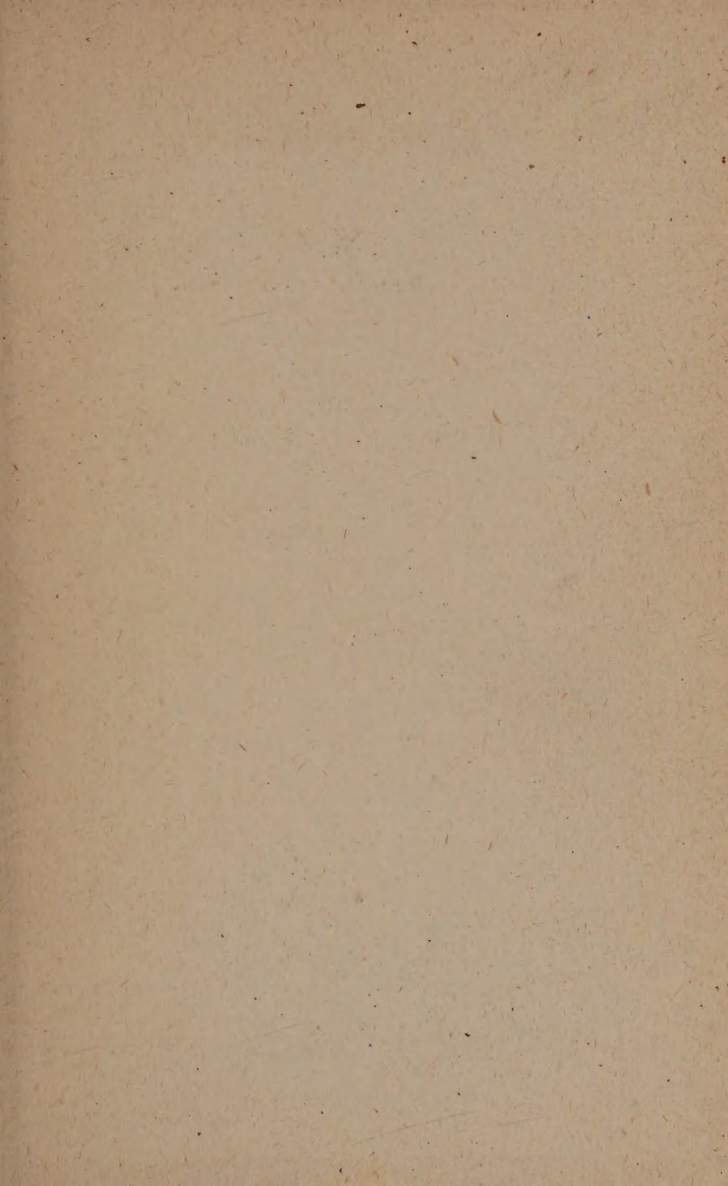
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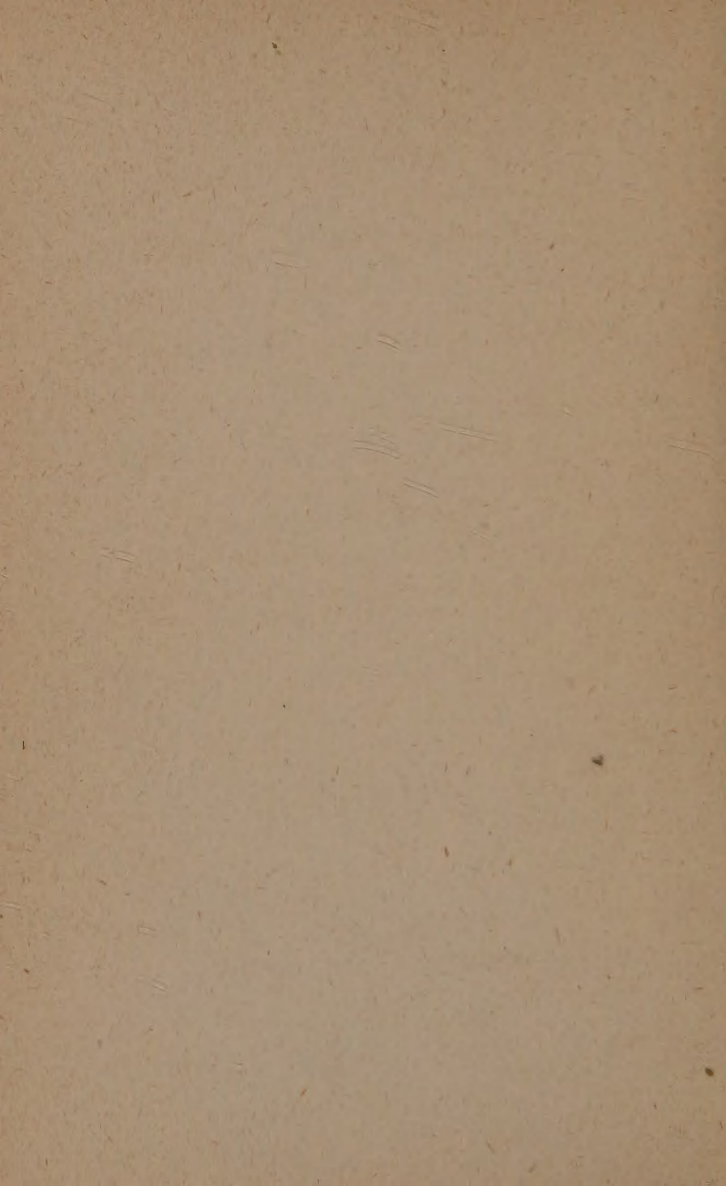


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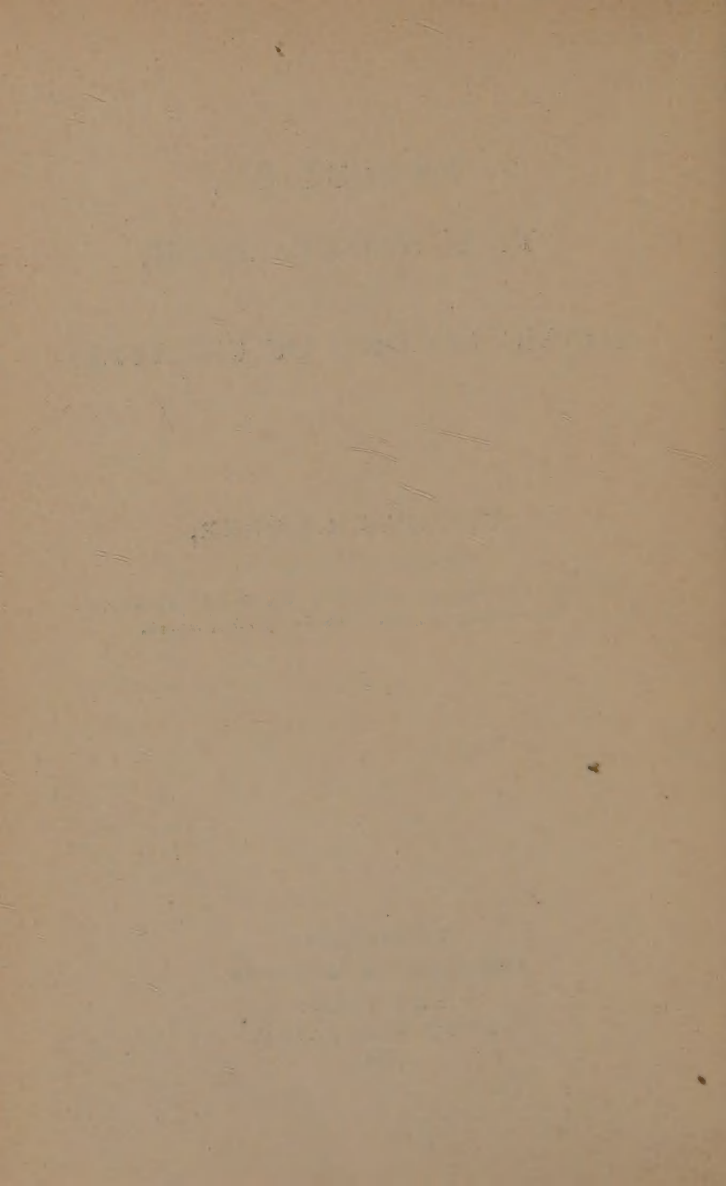
BY
THOMAS COOPER,

LECTURER ON CHRISTIANITY:

*Author of 'The Purgatory of Suicides,' 'The Paradise of Martyrs,'
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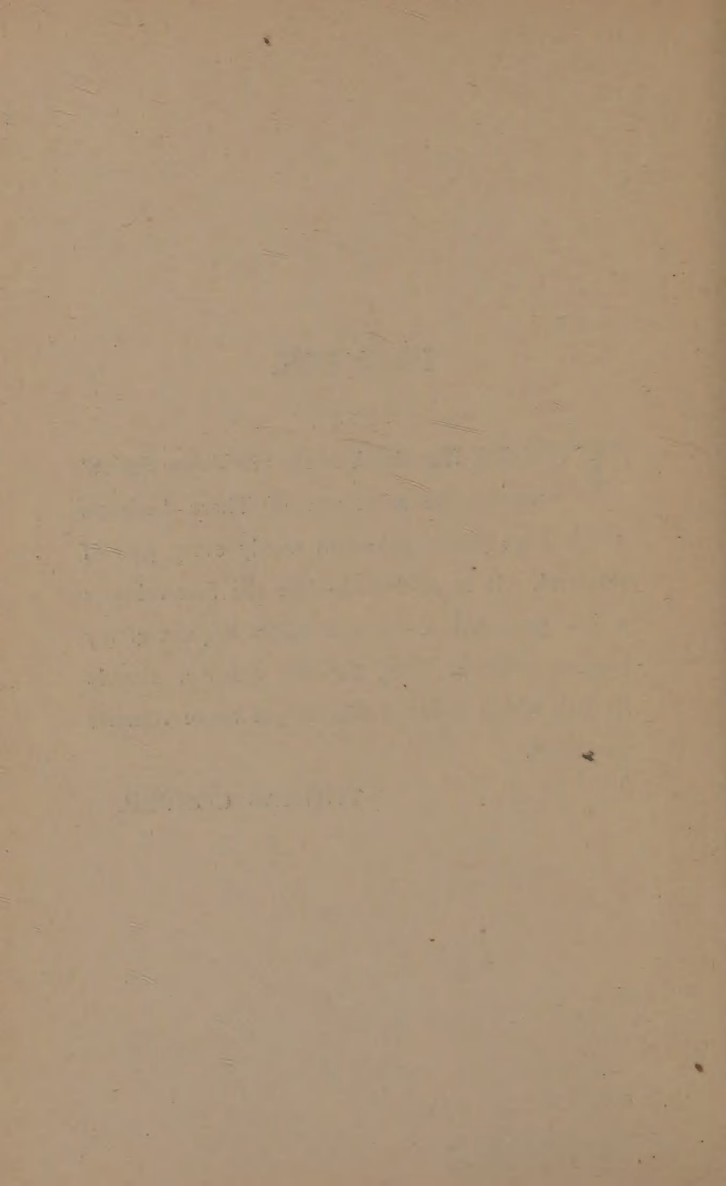
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PREFACE.

THIS fifth Handbook of my 'Evidence Series' contains the substance of Three Lectures which have been spoken in nearly every part of England. It is published—like the four volumes which preceded it—at the urgent request of my hearers, and, in brief, for the reasons, already alleged, which induced me to put those volumes into print.

THOMAS COOPER.



EVOLUTION.

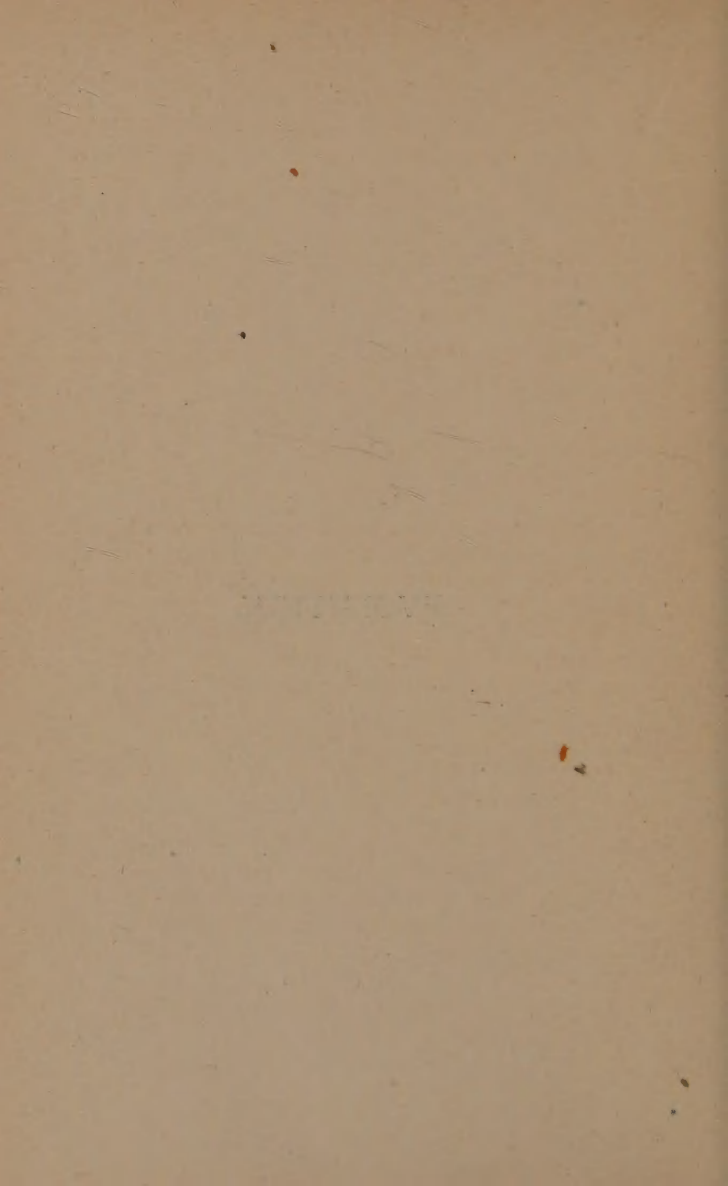


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EVOLUTION.

IF some of our honoured forefathers could awake from the dead, and tread again the soil of this dear old England that they loved so much, they would, doubtless, feel great amazement, mingled with exultant pride, when they beheld our commercial, industrial, and scientific progress. If the great men of the age of Elizabeth could be joined with the great men of our Commonwealth period, and look upon their native land as it exists now, with its advancing civilisation,—one cannot help thinking that the illustrious band of our great forefathers, which we have named, would raise hand and heart towards heaven, and say, with one voice, "Thank God, for what He has done for Old England ! and long may the dear old land prosper and flourish !"

But others might be named of our revered and honoured forefathers who, if they could live again, would experience very different emotions, on learning the nature of some great changes that mark our day. If the martyrs who were burned, in the reign of Mary, for their attachment to Protestant truth, could rise, and witness the spread of Ritualism and Popery among us, we are sure that it would distress them greatly. And, if the founders of the Royal Society—Sir Christopher Wren, and the Hon. Robert Boyle, and John Ray, the author of that good old book “The Wisdom of God in the Creation,” and their associates, could live again, and be joined by our illustrious Newton—such truly reverential men could not fail to express their deep mortification and sorrow, at the perverse attempt of so many scientific men of our time, to revive the Atheistic philosophy of the worst schools of ancient Greece.

The men who are considered to be the leaders in Science of the present day make it no secret that they throw the Design Argument, or Doctrine of Final Causes, to the winds. They tell us, without concealment, that they have ‘done with

teleology'—for they can discern no proof of design, or contrivance, or purpose, either in the living or inorganic world. They maintain that what we deem to be evidences of design and contrivance and purpose in Nature—and, therefore, proofs of the existence of the Creator—are, simply, the outcome and result of the action of the unconscious and eternal forces of matter. It is, they affirm, by the unconscious action of these forces, that the molecules and atoms of matter came to take their present forms. It may be very agreeable employment for our emotional nature, Professor Tyndall thinks, to be religious; but science, he assures us, teaches him no religion, and reveals to him no personal God. A personal God is unthinkable, says Herbert Spencer. And other scientific men do not conceal from us that they have similar convictions.

All this, be it remembered, is *new*, in our country. In the past time, when Hobbes and Hume, and some lesser men, intellectually, were busy in sowing the seeds of Unbelief, they were not countenanced, but opposed, by contemporary Englishmen who were foremost in scientific enquiry and discovery.

Nor did the sceptical plague which afflicted France in her great revolutionary struggle extend its contagion to the scientific mind of this land. Well-nigh half of this our Nineteenth Century was past before the English public became aware, by the tentative issue of what were deemed, at first, 'curious speculations in Natural History,' that some of our students and professors of Science were bent on the promulgation of views which must tend to the subversion of both Natural and Revealed Religion.

Since the history of these 'curious speculations' is the history of the Theory of Evolution, it will, now, be my duty to set it before you in as concise and lucid a manner as possible. A few words, however, must first be said on what already passed in France.

L

DE MAILLET AND HIS THEORY—LINNÆUS AND HIS
‘SYSTEMA NATURÆ’—LAMARCK AND ST. HILAIRE
—CUVIER AND PALÆONTOLOGY.

IN the year 1748, a French writer, named De Maillet, tried to persuade his fellow-countrymen that plants and animals were not special creations of God, but only spontaneously modified forms of ‘Nature.’ The influence of the beautiful and reverential spirit of Linnæus preserved men of science from adopting De Maillet’s theory; and the French public, of that period, only treated it with ridicule.

In the early part of this, our nineteenth century, three remarkable Frenchmen may be said to have created a new era in Natural History: Lamarck, who took up the theory maintained by De Maillet, and maintained the doctrine of ‘Transmutation of Species’—Geoffroy St. Hilaire, who leaned to the notions of Lamarck—and Cuvier, that greatest of all zoologists, who, like Linnæus, maintained the truth of the Design Argument, and that all descriptions of living beings are the special creation

of God. Lamarck had made the lowest animal forms his special study—such as the sponges, the jelly-fishes, the corallines and other zoophytes, and the shell fish; and the likeness among them seemed, to him, to show that one animal form had passed into another, and that higher animal forms had been ‘transmuted’ out of lower forms. His friend, Geoffroy St. Hilaire, inclined to take the same view, from his close observance of what is called ‘Homology,’ or the close resemblance of all the vertebrate animals, in the general plan of their construction—a resemblance, by the way, which our own countryman, the illustrious John Hunter, was wont strongly to insist upon.

Lamarck contended that the exertion of their desires was a great cause of the difference in the forms of some animals. He instanced the Swan and the Giraffe, as proofs of his doctrine of “Transmutation of Species.” The progenitors of these creatures, he contended, had as short necks as other creatures; but, by the exertion of the bird to get food at the bottom of a stream, and of the beast to gather leaves from high trees in the barren seasons of a torrid clime—the twain had

lengthened their own necks, in the process, it might be, of many hundreds of thousands of years. So also, he thought, the grallatores, or wading-birds,—such as the Crane and the Heron,—have lengthened their own legs, by persistency in going deep into the water, for their prey ; and the swimming-birds have originated the webs between their toes, by persistent attempts at swimming—also, in the process of unreckonable years.

Cuvier threw all his strength into the opposite views. He had, early, been a diligent student of human anatomy, and had extended his studies to the anatomy of the lower animals. He thus reached a firm conviction, which was never shaken, that there was supremely intelligent *purpose* in all the creation. The fact that every animal was fitted to get its own living, and to take care of itself and its species ;—that one part of an animal was so evidently adapted to the other parts, that seeing a part of an animal—a bone, or a tooth,—he could judge of what species or family the animal was—seemed conclusive evidence to Cuvier that God had separately and specially created each animal race, upon the earth

He remodelled the system of Linnæus, with a bold but reverent hand ; and, in doing this, he assigned the elephant, rhinoceros, hippopotamus, tapir, swine, horse, zebra, ass, and a few other animals, into a separate order: the 'Pachydermata,' or thick-skinned animals. Pondering on the fact that they were so few in number, he thought there must have been more of them at one period ; and then, guided by his profound skill in Osteology, or the science of the bones, he discerned that there were spaces—so to speak—between several of the species composing this order of the Pachydermata, for other species of such and such a form. Shall we call it prophecy, when he said such animals might be found? No : it was *true science* derived from an intelligent and devoted study of the Creator's plans—for the petrifications of the very creatures he had described, from wise and skilful foresight, were, soon after, found, in the gypsum quarries of Montmartre, outside Paris ; and he had the gratifying task of arranging them, for the Museum, with his own hands.

Cuvier, by thus founding the sub-science of Palæontology (or discourse of ancient animals)

may be considered as the real founder of Geology; for that great science, by his discoveries, grew into real importance in the eyes of men of science. Cuvier's name not only became the great name in zoology but all the elder geologists of our own country,—Buckland, Sedgwick, and the rest—ranged themselves under his banner, as believers in 'Final Causes,' or the doctrine of separate and special creations. It was otherwise in Germany. Goethe had already given hints that he suspected a derivation of man from the animals; and Oken and the Physiophilosophers had broached views utterly unlike those of Linnæus and Cuvier. But it was not known, until the year 1844, that the theory of Lamarck had any real disciples in England.

II.

'VESTIGES OF THE NATURAL HISTORY OF CREATION'
AND THE THEORY OF DEVELOPMENT.

IN that year, a book of a popular character was published, which may be said to have startled all sorts of people, scientific and unscientific. It was entitled 'Vestiges of the Natural History of Creation.' I went from Stafford prison to live in London, and commence authorship, in the year after that in which this book was published; and shall not soon forget the excitement there was among literary people, about this book. 'Have you read the Vestiges?'—'What do you think of the Vestiges?'—was asked on every side. Who wrote the book—was a profound secret; and for aught I know, it is a secret yet. Robert Chambers of Edinburgh was loudly charged with its authorship; but denied it. Dr. Neil Arnott, and other

scientific men,—and even Lord Byron's daughter, Ada, the Countess of Lovelace,—were also charged with the authorship of the 'Vestiges'—but all denied it. Of course the book had an author; but I am not able to tell you his name. In this book, what is called the 'Development Theory' was openly maintained. Unlike Lamarck, who was an atheist, this author, with expressions of reverence, acknowledged the existence of the Creator; and maintained that this theory of the 'development' of one plant out of another, and of one animal out of another, in conformity with a divinely appointed law of advancing improvement, was as worthy an idea of the Almighty Maker's way of creating, as our common idea of special and separate creations.

'Equivocal' or 'Spontaneous' Generation, however, seemed to be an article in the belief of the author of the 'Vestiges.' Some of you may be old enough to remember the noise that was made, about that time, concerning the experiments of Mr. Crosse, in electricity and galvanism. It was affirmed that Mr. Crosse had made an insect, and it was proposed to call it the 'Acarus Crossii,' in

honour of its scientific maker ! Poor Mr. Crosse publicly avowed his utter innocence of any such creation, and affirmed he had seen the 'Acarus' in question many a time before he beheld it in the alkaline solution made use of in his galvanic experiment. It was said he gave up his study and his experiments, in disgust with the use which had been made of his name. But Mr. Weekes took up the study ; and his experiments were understood to strengthen the advocates of 'Spontaneous Generation.' The author of the 'Vestiges' evidently inclined to their side ; and, very soon, some of the reviews declared that he was only a concealed atheist. Indeed, so little apparent encouragement was given to the 'Development' hypothesis by the press and the public, and so slight patronage seemed to favour it from men of science, that it was supposed we should soon hear no more of it.

III.

MR. CHARLES DARWIN, AND 'THE ORIGIN OF
SPECIES BY NATURAL SELECTION.'

BUT, on the 1st of July, 1858, two papers were produced for reading before the Linnæan Society, on the 'Origin of Species,' one written by Mr. Charles Darwin, and the other by Mr. Alfred Wallace. They were both naturalists of some fame. Mr. Wallace had contributed to our knowledge of animated nature in Malacca and the islands of the Indian Archipelago; and Mr. Darwin, by his charming book, 'A Naturalist's Voyage round the World,' and other services to science, had won high reputation. Mr. Wallace, aware of the long and large preparations made by Mr. Darwin, gave up to him the task of introducing their similar ideas to the public; and, in November, 1859, Mr. Darwin's book appeared,

announcing the theory which has made so much noise in the world : 'The Origin of Species, by Natural Selection.'

Some of us opened the book with indescribable curiosity, for the latter part of its title led us to wonder what the author could mean. *Selection*, of any kind, we reflected, must be an *intelligent* process : it could only be the action of *mind*. But what could be meant by *Natural Selection*? We found that in his first chapter, under the general title of 'Variation under Domestication,' the author treated of what he called 'Selection by Man;' and in the second chapter, under the general head of 'Variation under Nature,' he introduced us to his theory of 'Natural Selection,'—but showed us more fully what he meant in his third chapter, which was entitled 'Struggle for Existence.'

This struggle for existence—this battle of life—Mr. Darwin contends, is perpetually going on, both among plants and animals,—for every kind of plant and animal tends to increase so rapidly, that if every seed which falls to the earth were to grow, and every animal which is born were to live,

there would soon be neither plants nor animals. In the struggle for existence, continued life is secured for the plants and animals which are best able to maintain themselves in existence. A stronger plant exhausts the soil, and thus annihilates the plant which is weaker. If, in a nest of half a dozen young birds, two have longer and stronger wings, claws, and bills than the others, and this pair of birds breed, they will stand a better chance of life than weaker birds—especially if there comes a scarcity—because they can fly farther, and will have more strength to get food.

Again, the colour of certain birds gives them a better chance of life. Our grouse and partridge would soon disappear altogether if they were birds of bright colours; but because they resemble the colour of the soil and vegetation amidst which they live, they are neither annihilated by the guns of sportsmen nor by the ravages of creatures of prey. On the other hand, the white grouse, or ptarmigan, is comparatively secure in Norway, because it is of the colour of the snow. So, also, insects which are preyed upon by birds are preserved the more easily by being of the colour of

the leaves or stalks of plants. This is not 'Design'—it is 'Natural Selection.'

A few more words will enable you completely to understand what Mr. Darwin really means by his doctrine of the Origin of Species by Natural Selection. "Like produces like," as we commonly say. But we all know that, in the production of plants and animals, we constantly see degrees of unlikeness. Now Mr. Darwin contends that the tendency to produce unlikeness is sufficient to account for all the different plants and animals which have ever come into existence. Only, he demands unlimited time. Hundreds of years, or hundreds of thousands of years, are not sufficient: he must have millions of years. And then, he maintains, it is perfectly possible that all the known classes, orders, genera, families, and species, of both plants and animals, may have come to exist by one variation—however small—being added to another, and that to another, and so on.

Nay, he contends, that not only the forms and changes of physical structure in animals, but even their degrees of instinct and intelligence, and their propensities and habits, have grown by Natural

Selection. As for man, Mr. Darwin maintains that he is descended from a hairy quadruped with a tail and pointed ears, that was accustomed to live in trees. He means that we come out of the apes and monkeys. Lastly, he believes that our moral nature—our highest nature—is derived from the lower animals; for “the dog manifests love, reverence, fidelity, and obedience;” and so the religious sentiment in man comes by Natural Selection, as well as his physical form or animal nature.

IV.

MR. HERBERT SPENCER AND 'EVOLUTION'—THE
SYNTHETIC PHILOSOPHY—MR. DARWIN'S RE-
JECTION OF 'FINAL CAUSES'—THE GERMAN
PHILOSOPHERS.

AMONG the first men of science to declare their acceptance of Mr. Darwin's theory, were Professor Huxley, and the present President of the Royal Society, Sir Joseph Hooker, who superintends the great botanical collections at Kew, and who has contributed so richly to our knowledge of the plants of India. But the espousal of Mr. Darwin's theory by Mr. Herbert Spencer was more notable than the conversion to it of any of the men of science. Mr. Darwin calls him 'our great philosopher,' and Professor Tyndal calls him 'the apostle of the understanding;' and some are bold enough to affirm that

Mr. Herbert Spencer *knows everything*—nay, it is said that he himself thinks so! You laugh! but consider what an advantage such a conceit gives a man with the majority of mankind. Who believes you to be clever, if you tell people you know nothing?

Mr. Darwin was mightily gratified, no doubt, when Mr. Spencer avowed his discipleship; but the disciple soon chid the master, and told him he had attributed too much to ‘Natural Selection.’ Mr. Spencer’s enlightened conviction was that we must admit Lamarck’s theory of the Transmutation of Species, and the Development theory of the ‘Vestiges,’ as well; and having Laplace’s Cosmical Theory to start with, we must call this grand compound of theories—EVOLUTION. It is Mr. Spencer’s word, remember, *not* Mr. Darwin’s; and Mr. Darwin’s meaning, by the term ‘Natural Selection’ is better expressed, Mr. Spencer contends, by the phrase ‘Survival of the Fittest.’ Of course, you will expect that the ‘Apostle of the Understanding’ is a most prolific and superb coiner of words and phrases. His crowning work, however, has not yet been men-

tioned. Mr. Herbert Spencer has undertaken the creation of what is considered to be an entirely new system of philosophy, which he terms—'The Synthetic;' and it is from him that we are to learn, fully, what is meant by 'EVOLUTION.'

We are to start with the Cosmical or Nebular Theory of Laplace: the existence of the nebulosity—the hot, luminous nebulosity of the atoms and molecules of matter which the author of the 'Vestiges' called "the revolving fire-mist," out of which—as it contracted, and the outer part cooled, and threw off rings,—the planets of our solar system, and, finally, the sun itself, were formed. We are to regard our earth as having been formed from one of these rings. And now, how did life begin upon it? When the hot nucleus of our earth had cooled so far that some of the cosmic vapour surrounding it had taken the form of water, there would come about that great change which Professor Phillips, the geologist, used to describe: the forming of fissures in the earth's surface, by shrinkage, and the entrance of water into the fissures; and thus, by the force of steam, the breaking up of the earth's crust into rocks and

seas—into land and water. Life, we are allowed to believe, began in the water: vegetable life and animal life. Portions—most likely microscopic portions—of sea-mucus, or sea-jelly, *began to live*; and thus vegetable and animal life was begun!

“But begun *how*?” you will ask. I can only reply, *somehow*—for I know not what other answer to give, or by what other plain word to describe what, in scientific gibberish, they call ‘Spontaneous Generation.’ “A personal God is *unthinkable*,” says Mr. Herbert Spencer: if any power have originated the universe, he declares it must be an *unconscious* power. Mr. Darwin, in the announcement of his theory of the ‘Origin of Species,’ speaks of ‘the Creator’—but without any expression of reverence—as having given existence to a few forms of life, or—he afterwards says—to one primordial form, from which all other forms, vegetable and animal, have been developed by natural selection: plants, worms, insects, fishes, reptiles, birds, four-footed creatures, and Man. And, in the last chapter of the ‘Origin of Species,’ he tells us that he sees no good reason why the views given in his volume should shock

the religious feelings of any one. And he, further, tells us that 'a celebrated author and divine' had written to him to say that "he had gradually learnt to see that it is just as noble a conception of the Deity to believe that He created a few original forms capable of self-development into other and needful forms, as to believe that He required a fresh act of creation to supply the voids caused by the action of His laws."

Dr. Asa Gray, the great botanist of America, also declared himself a convert to the doctrine of Evolution, but holding fast by the doctrine of Final Causes, said God had guided the variation of plants and animals "along certain beneficial lines" just as man guides water "along definite and useful lines of irrigation." But Mr. Darwin rejected Dr. Gray's conclusion, and denied that "the formation of the most perfectly adapted animals in the world, man included, were intentionally and specially guided."

It was not long before the German philosophers, who had adopted Mr. Darwin's views, turned round upon him, and showed him the real atheism there is in his scheme. Carl Vogt boldly told

him that his theory "turns the Creator out of doors, and does not leave the smallest room for the agency of such a Being." "The first living germ being granted," Carl Vogt goes on to say, "the process of Evolution will account for all we see. Man is not a special creation, produced in a different way, and distinct from other animals, endowed with an individual soul and animated by the breath of God; on the contrary, man is only the highest product of the progressive evolution of animal life springing from the group of apes next below him."

And Carl Vogt only speaks out in bolder language what many of his countrymen say of Mr. Darwin's theory. Haeckel, who is considered the chief naturalist of Germany, also announces atheism; and Mr. Darwin, in his 'Descent of Man,' claims Haeckel's kinship in science, and declares that if the German's book had been published earlier, his own might not have been written: thus seeming to endorse Haeckel's doctrines. 'Evolution,' from the showing of its chief disciples, thus leaves us to gross materialism, the denial of the design argument, and of God's existence. Matter

is eternal, and its forces are eternal. The material universe has always existed ; but God has never existed. Christianity is only a dream : there is no soul : there is no future state : this is our only existence : when we die, we pass into annihilation.

I learn that some of you young men imagine it is very wise to become Evolutionists, and that you can retain your belief as Christians, at the same time. Then, I assure you, you must have a different set of ideas from Mr. Darwin's. So you will find it to be—only think, a little.

V.

TRUTH OF THE EVOLUTION THEORY CHALLENGED;
AND ITS ABSURDITIES EXHIBITED.

“**B**UT where are the facts?” you will be saying; and that is speaking English. The facts are what we demand, before we accept any theory. That is the great lesson taught us by Newton and Bacon; and we shall not depart from it. But neither Mr. Darwin, nor Professors Huxley and Tyndall, nor Mr. Herbert Spencer, nor Carl Vogt, nor Haeckel, dare to assure us that Evolution is ever witnessed now, or has ever been witnessed in the past. *So that there are no facts.*

“Oh, sir, you don’t understand what you are talking about,” some of the more confident partisans of the theory will say: “read Mr. Darwin’s book with clearer discernment. He tells you, what every botanist will tell you, that there are

forty different kinds of wild brambles and twenty different kinds of wild roses ; and yet the brambles have, doubtless, originated with *one* kind, and the wild roses have all come out of the *Rosa canina*, or common Dog-rose. The insects have done it all by inoculation. Mr. Darwin—who has paid very special and laborious attention to pigeon-breeding—will also assure you that there are three hundred and forty kinds of tame pigeons ; and that there can be no doubt that they have all originated with the common Blue Rock pigeon : now that kind of pigeon has but fourteen feathers in its tail, while the Fantail pigeon has often forty !!!

“Then think of the various breeds of dogs : there is the terrier, the ladies’ lap-dog, the King Charles’s dog, the pointer, the retriever, the mastiff, the bloodhound, the Newfoundland dog, the noble St. Bernard’s dog, the elegant fleet greyhound, and that thoroughly English dog—the bull-dog, which seizes the bull by the nose, and never leaves go ! Doubtless, they have also originated with one stock——”

“Nay,” says Mr. Darwin himself, “I think they must be derived from three or four stocks.” “Quite

a mistake," say some ; "the dog is certainly derived from the wolf." "Nay, from the jackal," says another ; while some positively affirm that the common shepherd's dog is the original animal, and all other dogs are derived from it !

"But, think again," say the Darwinians, "of the power man has to alter and improve the breeds of sheep and cattle and horses ; and think of the power their increasing knowledge gives to our gardeners to furnish us with superior carrots and turnips and lettuces and other vegetables—with superior plums and peaches and apples and pears—and with finer and more variegated flowers !"

Evolution ! my Darwinian friends—you have not touched it, with all your facts. This is all VARIETY : it is *not* Evolution. But we need none of your petty array of the instances of Variety. Variety is the stamp and seal God puts upon all He does in Nature. God never makes two creatures alike of any kind. His patterns vary perpetually and universally. He never makes two flowers alike of any kind : no two petals in the corolla of any one flower are alike : no two sepals in the calyx of any one flower are alike : no stamens of any one flower

are alike : no two leaves on the same flower-stalk are alike : no two sides of the same leaf are alike. No two insects, birds, beasts, or fishes of the same kind are alike : no two human beings are alike. No two hairs of the human head were ever examined under a microscope and found to be alike : no two human faces are alike : no two chins are alike : no two noses are alike : no two eyes in the same face are alike.

“What, sir !” exclaims some young lady, “do you mean to insult me by telling me that I have two odd eyes ?—for shame of yourself, sir !”

My dear young lady, your eyes may be as brilliant as diamonds—so that they sometimes make that young gentleman's heart ache but they are not alike. Do but examine them, courageously, in your looking-glass ; and you will find it out.

Evolution ! I say again, you have been talking about Variety—but not about Evolution. You know of no gardener who can evolve an apple-tree out of a damask rose, or a tulip out of a hyacinth, or a dahlia out of a marigold. Can you tell us of any man who has ever bred a pigeon into a jackdaw, or a jackdaw into a raven—a

sparrow into a sparrow-hawk, a fantail into a pheasant, a tumbler into a turkey—a greyhound into a tiger—or a bull-dog into a buffalo? Breed as you will, your pigeons are all pigeons still: you cannot advance them into hawks, falcons, or eagles. Breed as you will, your dogs are all dogs still—and they will all go to the dogs. Where are your facts? You have none; and so your theory must remain a theory.

The speech of Virchow—one of the most eminent men in Germany—lately delivered at Munich, at the annual meeting of Men of Science, will, it is hoped, tend to render the German evolutionists a little more modest, and teach them not to forget that they are, after all, only theorists. Haeckel and Nageli proposed that they should now claim to have the direction of education in Germany, and should demand to have the new doctrines taught. Virchow told them plainly that they could make no such demand. “So long,” says he, “as no one can define for me the properties of carbon, hydrogen, oxygen, and nitrogen, in such a way that I can conceive how, from the sum of them, a soul arises, so long am I unable to admit that we should

be at all justified in importing the plastidulic soul into the course of our education. . . . On the contrary, I am of opinion that, before we originate such hypotheses as the voice of science—before we say ‘This is modern science,’ we should first have to conduct a long series of careful investigations. We must therefore say to the teachers in schools, ‘*Do not teach it.*’

“As a matter of fact,” Virchow also tells his brothers in science, “we must positively recognize that as yet there always exists a sharp line of demarcation between man and the ape. *We cannot teach—we cannot pronounce it to be a conquest of science, that man descends from the ape or from any other animal.*” Such are the clear declarations made by one of the leading minds of Germany; such is his honest protest against concluding that the doctrines of Spontaneous Generation and Evolution are proven.

One does not wish to say aught disrespectful of a man like Mr. Darwin. As an untiring inspector of Nature and collector of facts, even of the minutest description—in other words, as a diligent contributor to the stores of human knowledge, Mr.

Darwin deserves honour; but he seems to coax himself into the belief that his theory *must be true*, notwithstanding all the difficulties—and even the unlikelihoods—he confesses that he sees in the way of such belief.

The rapidity with which Mr. Darwin's theory was spread, applauded, and considered to be established, must be regarded as one of the most remarkable facts of our time. But it is not difficult to account for the fact. When Mr. Wallace yielded to Mr. Darwin the priority of publication, it was understood that Mr. Wallace would support his friend. A number of naturalists, who were common friends of both, also threw all their strength into the effort to popularise the theory. They soon secured the adhesion and active services of a number of understrappers—members of scientific societies, and workers on magazines, reviews, and newspapers. As for the chiefs—Mr. Darwin himself, Professors Tyndall and Huxley, Sir Joseph Hooker, and Mr. Herbert Spencer—they constitute what the shrewd American writer, Wendell Holmes, calls 'The Mutual Admiration Society.' They are perpetually bespattering one another with

praise. And when Mr. Darwin received his Doctor's degree, at Cambridge, in the congratulation-meeting held afterwards by his friends and admirers, Professor Huxley declared that Mr. Darwin was "the greatest philosopher since Aristotle!"

This ecstatic laudation is a little amusing, when one considers some items of Mr. Darwin's philosophy. In the first edition of his 'Origin of Species,' the author sagely intimated that the whale might have been formed by 'Natural Selection' out of a Polar bear that found he could live, as the whale now lives, by swimming about with his mouth open, and swallowing the minute creatures that come into it! Our sage philosopher—"the greatest since Aristotle"—left all that out in his second edition, and it has never appeared since!

One cannot help wishing that Mr. Darwin had left out that equally marvellous imagination about the formation of the eye by 'Natural Selection. My copy of the book is one of the '5th thousand.' At page 186, Mr. Darwin, who rejects the doctrine of Final Causes, or Divine Contrivance—but who cannot write without using the word '*contrivance*' over and over again—admits that "to suppose

that the eye, with all its inimitable *contrivances* for adjusting the focus to different distances, for admitting different amounts of light, and for the correction of spherical and chromatic aberration, could have been formed by Natural Selection, seems, I freely confess, absurd in the highest degree possible." Yet, he goes on to assure us that 'Reason tells him' this is possible. He says "we ought, in imagination, to take a thick layer of transparent tissue, with a nerve sensitive to light beneath—[he does not tell us where he gets this nerve, to begin with!]
—and then suppose every part of this layer to be continually changing slowly in density," and "each new state of the instrument to be multiplied by the million,"—and thus, in "millions on millions of years," he thinks we may get a most excellent eye! Do not, any of you, think me harsh when I tell you that when I first read this passage in the famous 'Origin of Species,' I could not help saying to myself—'If Mr. Darwin had not put his name to this, should I not have concluded that it was written in a lunatic asylum?'

VI.

MR. DARWIN'S THEORY OF 'SEXUAL SELECTION'—
ITS IRREVERENCE TOWARDS THE GREAT MAKER
—VERY DIFFERENT THINKINGS OF OTHER
INTELLECTUAL MEN.

LET no one suppose that the fine fancies of "the greatest philosopher since Aristotle" are bounded by his marvellous conception of 'Natural Selection.' In his next book 'The Descent of Man,' we are treated with a new fancy: '*Sexual Selection.*' Mr. Darwin's fertile imagination leads him to believe that the greater strength of male animals, and the several other advantages they have over females, are really owing to the preference of the females. And our fertile-brained philosopher gives us two hundred pages on Sexual Selection among Birds, wherein he assures us that the brilliant colours and adornments of many of the

male birds, are owing to the taste and desire of the female birds. The hen desires to see a fine feather in a cock's tail, and so it grows there! The peahen desires and loves to see the eye-pattern and splendid colours in the peacock's tail, and so they grow there—generation after generation!

The great philosopher cannot be greatly acquainted with 'the sex,' or he would have never imagined that the female birds have taken such a stupid delight in seeing the same ornaments of the male birds for thousands of years. What! have *all* the pea-hens, for thousands of years, been enraptured with that one uniform pattern in the peacock's tail? The stupid creatures! had *we* worn tails, like peacocks, the ladies would have demanded a new pattern every month!

Seriously, this is not mere folly on the part of Mr. Darwin. It is a denial of God's power, and wisdom, and perfections. A correct mind cannot look on a beautiful bird, or a beautiful flower, without reverencing the power and wisdom of God, in their formation. Mr. Darwin denies that God is the great Artificer. He admits no design of the Almighty in Nature. The birds have beautiful

colours because the females like to see them, he foolishly imagines, not because God delights in the Beautiful.

I must tell you how much Mr. Darwin's whimsical theory of Sexual Selection degrades him in my humble estimation, when I remember how different were the thoughts of some of the intellectual men that I happen to have known. How different, for instance, were the thinkings of my eloquent friend, W. J. Fox—whose name some of you simply know as that of the late M.P. for Oldham—but others as that of the most perfect and refined orator of his time. He would often descant delightfully on the music of Keats and Shelley and Byron, and Milton, and Shakspeare, and insist that the ineffable melody of their verse rendered them the highest poets, in our estimation, and justly so, for it proved their transcendent sense of the Beautiful. “And so,” he would say, “the Infinite Maker fills His Creation with forms of such excelling and incomparable beauty, because He has the highest and most perfect sense of the Beautiful—for *God is the greatest Poet.*”

And, some of you who have read the *Life of*

noble Charles Kingsley, will remember how it is therein related that, in his last illness, in the dead of the night, he was overheard by his little daughter saying, in a clear voice—" *How beautiful God is !* " His fine mind, (which was filled with such deep love of Nature, was, doubtless, in his sleeplessness, summoning to remembrance some of the scenes and forms of beauty he had been familiar with ; and reflecting that He who made the Beautiful in Nature, must, in Himself, have all possible perfection, he uttered these simple, yet remarkable words.

I delight to call such men as the two I have just named my benefactors, rather than my friends—for I never learned aught but reverence for the Maker from them, when they spoke of Him. And I delight, still more, to remember that Newton and the highest minds that gave themselves to the study of nature, were foremost in reverence for God. How mournful, how deplorable, it is that our modern philosophers disdain to tread in the steps of their illustrious predecessors, and seem bent on ignoring the Divine Name !

VII.

‘THE REIGN OF LAW’—A WORD ABOUT ‘USELESS ORGANS’—MR. DARWIN’S FORGETFULNESS OF THE FORESIGHT EVIDENT IN GOD’S CREATION.

ONE of the keenest blows levelled at Mr. Darwin’s theory is that by the Duke of Argyll, in his book entitled ‘The Reign of Law.’ Mr. Darwin says it took millions of years to bring the eye to its present perfection; then how long, asks the Duke, did it take to bring a wing to perfection? How could any creature use a wing that was only partly grown—even if it were more than half-grown? The essay that follows, in the same book, on ‘Contrivance in the machinery for flight,’ is most excellent. Get the ‘Reign of Law,’ if you have not seen it. When you have read all which is there introduced on ‘Contrivance in the machinery for flight,’ and read it thoughtfully, I do not believe

you will think Mr. Darwin's theory to be a very sensible one.

"Useless organs" are much dwelt upon by the advocates of 'Natural Selection.' You cannot explain why they are found in man and the animals without their theory, they contend—while 'Natural Selection' leads them to perceive that when such useless organs are found in an animal they are to be regarded as remains of the creature from which the new animal has been evolved, or developed.

But suppose we cannot give the true answer to the questions—Why has the whale teeth, and why has man teats on the breast, which are of no use?—are we to be so foolish as to give up all we *do* know, because of that, and say we see no proofs of design or contrivance in nature, although they surround us on every side? Am I to be such an idiot as to profess that, having examined the human hand and arm, I cannot see that it is composed of parts put together for a purpose—notwithstanding the knowledge of all it enables me to do, I can see no proof that it is the work of matchless Intelligence and Power? Because I cannot understand everything, am I to stultify myself by declaring that I know nothing?

Do we not reckon *foresight* as one of the highest—perhaps, the very highest—intellectual power in man? We cannot, if we have any faculty of observation, fail to mark *foresight* as one of the surest proofs of the All-wise Maker's presence in Nature. Remember where the eye is formed. Not where any so-called 'Laws of Light' can operate upon it; but in the dark cavern of the womb! There, the spherical eyeball, the lenses with different refracting powers, the iris—or coloured rim for enabling us to admit or exclude degrees of light, and the mysterious provision for instant focussing—have all to be formed. And when the beautiful eye opens on the light, the beautiful and transcendent light opens on the eye; the adaptation—the inter-adaptation—is perfect. Oh, how strangely—I had almost said, how madly—in love with his theory of 'Natural Selection' must Mr. Darwin be, that he cannot see, or cannot acknowledge, all this to be the workmanship of the Divine Workmaster, and most indubitable proof of His glorious presence in Nature!

I cannot omit, for a moment, to point you to the formation of the lungs of the infant, while I am

inviting you to consider the eye. Remember, the lungs are formed where there can be no breathing. The life of the young creature in the womb is a part of the life of the mother while it remains there. There the delicate, silken-looking tissue of the lungs is formed ; and they are packed and folded with an appearance of order and symmetry that is wondrous. There, also, the minutely slender air-vessels and blood-vessels are all formed and completed. And when the delicate lungs feel the air, it fills them, and the young creature breathes and enters on its new life : the lungs are fitted for the air, and the air for the lungs ; the adaptation—the interadaptation—is perfect. Is it not amazing that Mr. Darwin is so wildly in love with his theory of ‘Natural Selection,’ that he cannot see, or acknowledge, this to be an undeniable proof of the perfect foresight and power of the Divine Workmaster, who thus fits and prepares a living creature in one state for living and enjoying existence in a nobler state?

VIII.

HAECKEL AND THE PLASTIDULIC SOUL—PESSIMISM
IN GERMANY—NECESSITARIAN TEACHING OF
PROFESSOR TYNDALL, AND ITS RUINOUS TEN-
DENCY.

IN Germany, with Haeckel as its chief champion, Evolution is pronounced to be unquestionable, and Religion is declared to be only fit for dotards and idiots. The true doctrine is 'Monism,' or One-ism : a belief in the sole existence of matter. There is nothing spiritual in the universe. All Matter is alive ; and Thought is a property of Matter, and ripens by Evolution. When the protoplasm, or bioplasm,—the first cell of an organism of the lower creatures,—is formed of carbon, oxygen, hydrogen and nitrogen, a plastidulic soul is formed. This material soul ripens into sentience ; in the vertebrates into instinct ; and in the higher mam-

malia into intelligence. When Man dies, the plastic soul ceases to be—for Man's future is, simply, annihilation of all consciousness.

In addition to Monism, another dreary and most wretched form of unbelief has arisen in Germany. It is the doctrine of Schopenhauer, Hartmann, and others, and our writers call it 'Pessimism.' Leibnitz, the great rival of our Newton, in the discovery of the calculus, taught Optimism—or the doctrine that all things are for the best; but these writers teach Pessimism—or the doctrine that all things are for the worst. Human life, they affirm, is guided by Necessity. Man has no Free-will. He is but a poor miserable creature who cannot help himself, or help what he does. He and his children are the helpless prey of all sorts of diseases and disasters. Death dogs his steps, both on sea and land. Disappointment and disgust are his portion. He is not so happy as a bird; and a bird is not so happy as an oyster. The only happiness for man will be when he dies, and sinks into eternal unconsciousness.

One feels some doubt whether these grand philosophers really believe their grim theories. For,

if they did, we cannot help thinking that we should hear of them and their disciples, by scores, cutting their own throats, or hanging or drowning themselves, every week. When a man chooses to live, he cannot feel it to be so very hard and miserable, after all.

But, seriously, who can wonder that Pessimism is the form that Unbelief has, at length, taken in what we have been accustomed to call 'the great intellectual German Fatherland'? When men come to persuade themselves that there is no God, and no hereafter—when they voluntarily relinquish the elevating hope and trust that there is a nobler and better state for Man, when this probationary life is ended, and cease to believe that it is worth living a holy life that we may win that higher state—who can wonder that dark discontent takes possession of the soul, and existence comes to be regarded as a curse rather than a blessing? When a man persuades himself that there is no truth worth seeking for, no cause worth suffering for, no purity worth striving after, no nobleness in life itself—one cannot wonder that he comes, at last, to look upon everything around him with disgust, and to say that life is not worth having. The only

wonder is, that he cleaves to life when he regards it as one dreary experience of wretchedness.

“ Well, but,” some of you will say, “ our English Men of Science have not joined the Pessimists of Germany. They have not enunciated this doctrine of misery in England.”

True : yet, they have taken the steps leading to it. Huxley proclaims that man is an Automaton—a mere machine ; and Tyndall declares that Free-will is a misnomer, and that what a man does he cannot help, even if it be murder. To my mind there is no teaching so pernicious as to tell a man that he cannot help what he does. What is to lead a man to struggle against temptation, if you bring him to believe that he cannot help what he does ? What is to prevent his moral ruin ? what is to induce him to refrain from committing a wrong, especially if he believes he shall not be found out ? Could you trust such a man with your wife—with your daughter—with your money ?

No moral man that I have ever known really believed that he could not help what he did. I am sure of that—although I have known several

highly moral men who professed to believe that they were 'the creatures of circumstance'; for their own uprightness of dealing, their own anxiety to do right, and their hot displeasure with those who did wrong, proved that they did not believe that men cannot help what they do.

It is a great crime, I humbly think, for a man like Professor Tyndall to proclaim such a doctrine. It is the way to render human beings indifferent to the voice of conscience, and so to lead them to moral degradation. Put out a man's eyes?—you would not blind him half so effectually and ruinously as you would if you could succeed in quenching the inner light of his moral nature. Paralyze a man in every limb?—you would not render him a thousandth part so utterly helpless and decrepit, as you would if you could succeed in dethroning within him the rectoral power of conscience.

The leaves of the 'Stone Book,' it is affirmed, give indubitable proof of the truth of the Evolution doctrine. I, therefore, propose to enter with you on a brief reading of their contents and teachings, to-morrow night.

THE STONE BOOK.



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THE STONE BOOK.

NONE of the theories of which I spoke to you last night, can be considered new. The notions of De Maillet, and Lamarck, and Darwin—the speculations of Herbert Spencer, and Tyndall, and Huxley, and Haeckel, and Vogt, and the rest—are really but so many varying expansions of the old Ionian philosophy, which was taught by Empedocles and Democritus and Epicurus; and which Lucretius afterwards described in Latin verse. What we were wont to consider as the old worn-out song of the eternity of matter and its forces, and of the formation of all things by the fortuitous concourse of atoms, is now revived, with but little variety in the modulation. A man might lay a wager against odds, and be sure of winning, that you could not mention a modern theory to

him, but he could show you that it was to be found among the ancient Greeks. For, most assuredly, there never was such a set of men in the world for inventing theories as the old Greek philosophers. They would make you theories at a halfpenny a yard, a whole summer's day long, and begin again eagerly the next morning, and make you as many more.

Geology, on the other hand, is a new science. The ancients really made no approach to it. We cannot help wondering at this—wondering that early men did not say to one another, ‘What is there under our feet? Let us dig down as far as we can, and see.’ But there does not seem to have been much curiosity of that kind among early men. Yet there was mining in the early time. Copper and silver mining were both entered upon very early. Iron mining was later. Iron is only mentioned *four* times in the Pentateuch, while brass is mentioned nearly *forty* times; brass—which ought to have been called bronze: nine parts copper and one part tin: for that was the mixed metal of which ancient men made their weapons and other implements, before they made them of iron. Brass

is a modern metal, composed of copper and zinc. It seems past a doubt that the ancients came to Cornwall for their tin : they have left us no record of tin having been found elsewhere. The ' surface tin,' as it is called, of Australia and Tasmania, has nearly put an end to the mining of Cornish tin—which lies deep, and is very expensive in the working. Besides, it has been found that the small island of Banca, which lies between Sumatra and Borneo, contains such an abundance of tin that it can supply all the wants of the world for thousands of years to come.

When the ancients had finished their mining for the metals, their curiosity seems to have carried them no farther. Even the Greeks, the most intelligent race in the world, so restless as they were in almost every kind of inquiry, seem to have been as incurious in this respect as other ancient people. That Aristotle should have evinced no desire to know what was in the interior of the earth, and never have proposed to institute such inquiry, seems the most amazing of all facts. A mind of such universal grasp has, perhaps, never existed since among men. He has left us noble treatises

on natural history and law and government, on logic and rhetoric and poetry, and on morals ; but the idea of the search we speak of never seems to have entered into his mind.

Ovid, in the 'Metamorphoses,' tells us a good deal of what Pythagoras and the Greek philosophers taught, by way of guess and deduction mingled, as to the changes the earth had undergone: how earthquakes and other natural phenomena had effected such changes, and how they reasoned, when they found sea-shells on high hills and far inland, that parts of the land had once been sea, and the sea land. But the ancients seem to have made the most monstrous blunders—judging from the curious details in the 'Natural History' of Pliny the elder—respecting petrifications, when they were dug up. There can be little doubt that what were believed to be the disinterred skeletons of human giants were often, in reality, the remains of ancient saurians and other monstrous inhabitants of the old world. The great Italian painter, Leonardo da Vinci, who was a man of almost universal knowledge, startled some people, one day, who brought him some immense petrifications, by

telling them that the bones could never have belonged to any such creatures as were then on the earth, but must have belonged to gigantic animals which lived on the earth in past ages. That is about four hundred years ago; and Da Vinci seems to have been about the first person on record who made such a truthful remark.

And, indeed, it would have been dangerous to make free remarks, either as to what might be the antiquity of the earth, or as to what animals lived upon it before Man,—in countries where Popery held sway, four hundred years ago.

I.

BRIEF HISTORY OF GEOLOGY.

TWO hundred years ago, Hooke, and Ray, and Woodward, members of the newly instituted 'Royal Society,' and others, were full of anxious speculations about the nature of the earth's interior and the causes of the formation of its crust. Dr. Thomas Burnett was also famous for his imposing book respecting the ancient earth. Sir Charles Lyell, in his 'Principles of Geology,'—the great text-book of the science, will give you a deal of interesting information respecting these famous English speculators of two hundred years ago. Nearly all of them threw one great hindrance in their own way, and in the way of others, as Sir Charles will tell you, by trying to make all their speculations conformable with what they believed to be the meaning of the Bible account, and then

quarrelling about it. Hooke, Ray, and Woodward, once formed the sensible resolution of entering on practical study, and collected fossil shells and pieces of chalk, coal, slate, and stone, and some other minerals. But they did not persevere; and yonder lie the collections on the shelves of the Woodwardian Museum in Cambridge, it is said, to this day!

In 1775, the celebrated German professor of Mineralogy, Werner, began to deliver lectures on the earth's strata; and taught, most emphatically, that the changes in the earth's crust were brought about by the action of water. A rival school was soon started in Edinburgh, by Dr. Hutton, a Scottish physician, who was joined by the illustrious Playfair, whose beautiful classic monument you will see on the Calton Hill when you visit that most beautiful city. The Scotch school maintained that the transformations of the earth's crust had been effected chiefly by the agency of fire. So, now, there were the rival schools of the Neptunists, as the party of Werner were called, and of the Plutonists or Vulcanists—for the adherents of Hutton and Playfair were called by both of these

terms. Much intelligent discussion, as well as mere wordy warfare, arose between these rival schools; but geology can scarcely be said to have received its proper foundations from either.

It was left to a plain man of the plain name of William Smith to become the real father of English Geology. He was a surveyor of land, who began in early life to take notice of the varied forms and sizes of hills, of the different strata or layers of the soil, of the chalk and the flints found in it, and of the various forms of shells found in the different strata. At length, he set about experimental study in thorough earnest, and in 1790 commenced making journeys on foot into every part of England—descending into gravel pits, and stone quarries, and coal-mines, and fissures of the rocks, in order to complete his observations. In 1799 he published the result of his labours, describing all the strata of England, so far as he had observed them. So the first book, worthy of the name, on the great science of Geology, was only published one year before the close of the last century. In 1815,—the year of the battle of Waterloo,—William Smith published the first English Geological

Map. So you see how modern is the science of Geology.

Since the publication of William Smith's map, scarcely any study has been pursued with so much eagerness as that of Geology. The strata of the earth have been classified, and named, and re-named, several times; but if no more had been done—if Geology had been confined merely to the study and arrangement of the different layers of the earth's crust, it would never have risen to be the commanding science which it is now. It was the commanding mind of Cuvier which first gave Geology its true importance. When, by his profound knowledge of Osteology, he had foretold that the petrifications of pachydermatous animals of certain intermediate forms might yet be found, and *they were found*, and he had arranged the precious relics on the Museum shelves at Paris with his own hand, the scientific world became fully awake to the real value of the new science—for they saw how it comprised the great problem of the earth's antiquity, and the various kinds of life that had existed upon it, and that it might lead to the unmistakable understanding of the problem.

The Geological Society of London was soon formed; and William Smith received a diploma, as an acknowledged man of science; and he and his nephew Phillips entered on larger labours; a Professorship of Geology, for Buckland, was founded at Oxford, and another at Cambridge, for Sedgwick; and soon our Murchison and Lyell, and Conybeare, and Forbes, and Ramsay, and others, made themselves famous as Geologists. In France and Germany, and in America, the new science also became the 'rage of the day,' as we phrase it.

II.

CHANGES IN THE THEORIES OF GEOLOGISTS.

HAVING, thus hastily, sketched the history of the science, I must impress on your attention one very important fact: that wherever the petrifications of extinct species of animals were discovered, they were—up to the close of at least the second decade of the present century—held to be proofs of the historical truth of the Bible record of Noah's Flood. The words of Cuvier himself are very decided:—

“I am of opinion, with M. Deluc and M. Dolomieu, that if there be any circumstance thoroughly established in Geology, it is that the crust of our earth has been subject to a great and sudden revolution, the epoch of which cannot be dated much further back than five or six thousand years ago. This revolution has, on one hand, engulfed, and

caused to disappear, the countries formerly inhabited by men, and the animal species at present best known ; and, on the other, has laid bare the bed of the last ocean, thus converting its channel into the present habitable earth."

Our own Buckland—afterwards Dean of Westminster—and Sedgwick, and the rest, held the same opinion ; and held it stoutly. Buckland maintained this view in his celebrated book '*Reliquiæ Diluvianæ*,' which contained an account of Kirkdale cave, in Yorkshire. The cave was discovered in the year 1821, accidentally, by some stone-quarry workers. It was about two hundred and fifty feet long, and the roof of it barely enabled a man to stand upright. An immense quantity of broken bones of the elephant, hippopotamus, rhinoceros, bison, horse, bear, and tiger, were found under a thick covering of clay. There were also bones of the smaller animals. The mouth of the cave was so small that large animals could not have lived in it. And as the fragments of their bones were gnawed and channeled in a peculiar manner, while the teeth and bones of hyænas were found entire, Dr. Buckland reasoned that the cave

had been tenanted by these creatures, which always channel the bones to get at the marrow. He concluded that they had carried to this cave parts of the bodies of large animals, and the entire bodies of the smaller creatures, and had been drowned in their den, at the Deluge.

As I am simply sketching the history of the changes in opinion among geologists, I must not stay to do more than remind you that the tradition of the Deluge exists in the literature of Greece and Rome, as well as in that of China, and, according to Sir William Jones, in the Sanscrit literature of India; and that the ancient Scandinavians and Egyptians had similar traditions—while the ancient Mexicans and Peruvians, as well as the tribes of North American Indians, and scattered islanders of the Pacific, also shared them; that the famous medal of Apamea, in Phrygia, is also held to be strongly confirmative of the verity of the Bible account; and that the recent discovery of a long cuneiform record by the lamented George Smith, of the British Museum, which must have been written in ancient Assyria, 600 years before Christ, has brought still stronger confirmatory testimony

to the front. I say, I must not stay to do more than merely mention these facts. Geological history demands that I next relate to you how a novel theory arose among geologists.

The French geologists, with the exception of Cuvier and a few others, soon began to make light of the history of Noah's Flood; and M. Elie de Beaumont boldly declared his opinion that "not one cataclysm only (the common Greek word for deluge, or inundation,) had occurred in the history of the earth, but thirty or forty." In other words, he contended that every successive stratum of the earth, or layer of its crust, has been caused by a fresh cataclysm. After some years, this theory was deserted, and was somewhat scornfully styled "the Convulsionist theory." But it received the adhesion of Buckland, and Sedgwick, and Murchison, and Phillips, and Conybeare, and almost all geologists, and was held by Sir Charles Lyell up to the time that he published the tenth edition of his 'Principles.' Sir Charles also held the truth of the Design Argument, and our old belief of the separate creation of species up to the time of the publication of that edition of his book. Sir Roderick Murchison

—long after other geologists had changed—used to say, “I am a Convulsionist still ;” and Dr. Whewell, the great Master of Trinity College, was a Convulsionist till his death.

The next change of theory was to that usually called ‘the Uniformitarian.’ This was the theory of Sir Charles Lyell when he died ; and it is—or was, till very lately—the prevailing opinion of all living geologists. The Uniformitarian theory of Geology teaches that, although the earth’s crust has always been undergoing some disturbance, in one part of it or another, from the action of volcanoes and earthquakes—yet there has been no extremely violent or complete change in it, by cataclysms or other forces. This theory affirms that the earth has been going on, for many millions of years, just in the way it is going on now. Rivers have carried down the mud and detritus of rocks and other substances, and slowly formed deltas at their mouths, and thus created new land. Denudations—or strippings-off of one stratum from another—have laid bare the under stratum : thus, it is held that the chalk and greensand have been stripped off from the Wealden clay, from Shakspeare’s Cliff at

Dover to Beachy Head, in Sussex, in the lapse of many thousands of years. Upheavals of one side of a continent—that of Scandinavia, for instance—are always slowly going on, while the other side is as slowly sinking. New islands, or continents, are being perpetually prepared by coralline zoophytes, through long ages—and so on, for other changes. But, of late, there have been some decided demurrers to the Uniformitarian theory, and there will be more. Nothing less than some sudden and mighty dislocation of the strata, can possibly account for the formation of deep valleys and gorges, which are beheld in many parts of the earth.

III.

SKETCH OF THE SCIENCE OF GEOLOGY: PRESENT
CLASSIFICATION OF THE LAYERS OF THE
EARTH'S CRUST: FORMATIONS AND STRATA:
THE AZOIC ROCKS.

I MAY be talking to some—perhaps, to many —who have a good general knowledge of Geology, and are familiar with its technicalities. But, I fear, the greater number of my hearers know little of what they are accustomed to call its 'hard names,' and are unacquainted with its classification. I address myself almost always, you know, to those who need teaching, and who wish to be taught; and so I must endeavour to make it plain what GEOLOGY is. The word, you all know, means *Discourse about the Earth*. But Geology concerns itself little with the inner part of the globe on

which we live, and deals with what we call its 'crust,' or outer part.

"But what about the inner part?" you will ask: "can you not begin by telling us something about that?"—and I wish I could gratify you. But the various theories about the inner state of the earth leave us completely in uncertainty. No one doubts that there is intense heat within our globe; and many scientific men hold that by far the greater space within it is filled with melted matter: matter in a state of what we call 'white heat,' or fusion. Others think that there is considerable solidity within it; and a few eminent men of science are decidedly of opinion that the very centre of the earth holds matter as solid and heavy as platinum. On the other hand, many judge that there are huge rocky and vacant spaces in the earth, and that some of these are filled with water. So, you perceive, I cannot satisfy you as to what is the state of the innermost earth. You can only hold safely by the fact that it contains great heat, from the fact that the lowest mines are the hottest, and that there are hot springs in various parts of the earth, and volcanic action.

I must ask you to divide the crust of the earth, in your own minds, into two parts, and to distinguish the innermost crust as Azoic, and the uppermost as Zoic : the first term being applied to the rocks which contain no ‘petrifications,’ or *forms of life turned into stone* ; and the latter term meaning the contrary.

I shall claim your attention but for a short time while I describe the Azoic rocks, as they do not so absorbingly fill our minds with the great problems of past existence on this earth, as do the Zoic or Sedimentary Rocks, as they are also called. ‘Rock,’ I may observe, is a term somewhat clumsily applied to *all* the earth’s layers—whether clay or stone, hard or soft, by Geologists.

Granite (something *grained*) is held to be the lowest layer of the earth’s solid crust. It is composed of quartz (which is chiefly silica, or the base of flint), felspar (which is chiefly aluminium, or the base of clay), and mica a thin, scaly, and shiny substance. Syenite (from Syene, a province in Egypt, where it abounds,) is a variety of granite, which instead of mica, contains hornblende, a substance like black glass. Rocks of syenite are

found at Mount Sorrel, in Leicestershire; common granite abounds in Scotland, and in Cornwall. The last-named county unfolds another and very beautiful kind of granite, called Serpentine; and by the side of Arthur's Seat, near Edinburgh, a less beautiful kind abounds, called Porphyry, (from the Greek word for purple).

I must next mention what are often called the Trap rocks, and sometimes Greenstone or Whinstone, and Basalt. The Greenstone rocks often are found to consist of mere veins of stone shot up, doubtless, in the fused or lava state, from beneath the granite, and penetrating their way for miles to the upper crust of the earth. At other times Greenstone or Whinstone is found in huge masses, as in the Cheviot Hills. It is believed that the melted matter, originally, was shot up beneath the sea, because it is so dense: the lava from our volcanoes—called pumice-stone—is light, from having been shot up into the air.

Basalt must also have been shot up from the earth's interior in a fused state. It is a remarkable substance—being columnar in form, and the columns being in jointed pieces, and of geometrical

shape. The famous 'Fingal's Cave,' in the isle of Staffa, and the 'Giant's Causeway,' on the northern coast of Ireland, afford grand specimens of Basaltic formations. Columnar Basalt is also seen in the volcano of Hecla, in Iceland.

I have said that granite is held to be the lowest layer of the Earth's crust—but there is also a belief among scientific men, that granite is constantly being formed by chemical agencies: a theory into which we have not time to enter, now.

IV.

CLASSIFICATION OF THE ZOIC, OR SEDIMENTARY
ROCKS, OR LAYERS OF THE EARTH'S CRUST WHICH
CONTAIN PETRIFACTIONS AND MARKS OF EXTINCT
VEGETABLE AND ANIMAL LIFE.

THE sedimentary rocks, or upper layers of the Earth's crust, are held to be about thirty-two miles in thickness. "Thirty-two miles!" some of you may be ready to exclaim: "do you mean that any man, or company of men, have ever dug down into the earth to such a depth?" The answer will be, No; perhaps two miles may be considered the limit of the depth to which men have ever 'sunk' or bored into the earth. But you will soon understand how the thirty-two miles have been measured. If you placed a number of books one upon another on their flat sides, and put them on a table, you could not learn the contents of the

book at the bottom until you had released it from its position. But if you placed the books on the shelves of a library, you could easily know what was inside any of the books. So, while the rocks lie one on another, to a great depth, you cannot measure them. But if they be thrown down beside each other, you can learn their size. Now, you will often see this *bouleversement*, as the French call it—this tilted-up condition of the Earth's strata—if you be industrious enough to observe the appearance of the cuttings as you travel along a railway. It is because the layers of the Earth's crust have been thrown up and broken by interior forces, that it becomes possible to measure the layers.

You will, perhaps, feel surprised when I tell you how unequally the sedimentary rocks have been divided into three great 'Formations,' called the Primary, Secondary, and Tertiary—or Palæozoic, Mesozoic, and Kainozoic formations. The Primary, or Palæozoic formation, consists of about twenty-six miles of strata out of the thirty-two that I have just mentioned ; the Secondary, or Mesozoic formation, consists of about three miles and one-third of a mile ; while the Tertiary, or Kainozoic,

consists of about two miles and two-thirds of a mile.

“Did geologists get any hint from any very ancient book, or tradition, to guide them in thus dividing the Earth’s strata?” some of you may ask. The answer is, most positively, No ; and be pleased to remember it. The classification of three formations was forced upon their minds by what they have called the *unconformity* of the three formations. When they observed the evidences of some mighty breaking up, contortion, and twisting and upheaval of the strata between the Palæozoic and the Mesozoic, and, again, between the Mesozoic and the Kainozoic, and still more when they contemplated the evidences of almost entirely different kind of life in the Palæozoic as compared with the Mesozoic,—and also, in the Mesozoic as compared with the Kainozoic, this division into three formations was forced upon them, and was unavoidably adopted.

V.

THE PRIMARY, OR PALÆOZOIC FORMATION : ORDER
OF POSITION OF ITS LAYERS OR STRATA ; AND
BRIEF DESCRIPTION OF THEM.

‘PALÆOZOIC,’ be it observed, means *relating to ancient life*; and the lowest formation of the sedimentary rocks is so called because it contains marks and petrifications of what are considered to have been the most early life-forms on this globe. Let us begin at the beginning—at the lowermost part of the formation. Resting on the granite, we come first on an immense mass of rocks, about sixteen miles in thickness, which for some time bore the unsettled titles of Metamorphic rocks, and Transition rocks, and Grauwacke and Gneiss, and other questionables. Sir Roderic Murchison devoted himself to a study of these rocks, and soon published his book entitled

'Siluria'—giving the name of *Silurian* rocks to the slates and limestones and flags and grits and sandstones of Shropshire and the parts of Wales adjoining that county—which were, ages ago, inhabited by the Silures. Professor Sedgwick also diligently examined these rocks, and insisted on giving the name of *Cambrian* (from Cambria, the ancient name of Wales) to the lower and denser of them. The division, however, has not rested there—for the term *Laurentian* has recently been given to the very lowermost and hardest of these rocks, by Sir William Logan. The name is derived from the river St. Lawrence in Canada, for it is on the banks of that river that *gneiss*, as this hardest of rocks used to be called, most abounds. It is also common to some of our Hebrides, or Western Islands of Scotland. The order of position, thus far, will be—beginning from the bottom : 1. Laurentian ; 2. Cambrian ; and 3. Silurian rocks.

4 and 5. We next come upon a double layer of the Sedimentary rocks, which were formerly classed as single, being called 'the Devonian, or Old Red Sandstone.' They are now called the Devonian, and Old Red Sandstone. And whoever has walked

along the foot-pavement of Plymouth or Devonport in a shower of rain, and marked the beauty of the variegated limestone slabs—which the natives fondly call ‘Devonshire marble,’—will agree at once that they ought to receive a different nomenclature from the coarse red rocks of Herefordshire. Yet the ‘Old Red’ is not always of the same colour. In Forfarshire, it is a mottled dark gray, and is very extensively used for slabs of footways—while in Morayshire it is of a fine yellow brown, almost approaching to cream-colour, and gives a beauty of a peculiar kind to the newer part of the ancient cathedralled city of Elgin.

6. The Mountain Limestone lies above the Old Red. It takes the name of Yoredale rocks, in the north of Yorkshire, from the river Yore. It is usual to call the Mountain Limestone the beginning of the Carboniferous, or Coal-bearing strata—for it is often intersected by coal.

7. The Millstone Grit—so abundant and so well known in Yorkshire, usually lies above the Mountain Limestone; but the Yoredale rocks often pass into it without any ‘unconformity,’ in geological phrase; and often, it is also intersected by coal.

8. The coal measures—to us, the most important strata of the Palæozoic formation—come next. We have one seam of coal, in England, which is thirty feet in thickness. It is beneath the ‘Black Country,’ between Dudley and Wolverhampton, and is the property of the Earl of Dudley, the great ‘coal king,’ as the colliers call him. But our British coal seams are commonly from five to ten feet in thickness ; and some seams are worked which are less than three feet—the poor collier having to toil on for hours, in a cramped-up posture, with his ‘pick,’ or sharp hammer, by the dim light of his Davy lamp, to procure for us this great requisite for our daily comfort and use.

Between the seams of coal, slaty and clayey shales, and thin layers of limestone and sandstone, are often found ; the most valuable substance, however, which is mixed up with the coal seams is iron ore. It is found in abundance in all our coal districts : in Yorkshire, Northumberland, and Durham, and in Staffordshire ; and also in Wales and Scotland.

9. The Permian (so called from Perm, a province of Russia, where it abounds) or Magnesian

Limestone, forms the uppermost stratum of the Palæozoic formation. It is found in Nottinghamshire—where it has been quarried to build the new Houses of Parliament. It extends in a thin line through Yorkshire; and extends over a small part of East Derbyshire, and over a larger part of Durham: at Sunderland, in that county, it often takes the name of Dolomite—a stone exhibiting **a** variety of whimsical forms,—at which we need not wonder, for the language of Dr. Dawson, in his ‘Story of the Earth’ is—“Then came on that strange and terrible Permian period, which, like the more modern boulder-formation, marked the death of one age and the birth of another.”

VI.

PETRIFACTIONS—OR, EXTINCT LIFE-FORMS TURNED INTO STONE—FOUND IN THE PRIMARY OR PALÆOZOIC FORMATION.

WE will, to relieve ourselves of anything like too much dry detail at once, reserve a description of the strata in the other two formations until we have glanced at the petrified life-forms in the Palæozoic.

Limestone has been found intersecting the *gneiss* or Laurentian stratum, and in it has recently been found what is considered to be the earliest of all forms of life. Sir William Logan discovered it, and Principal Dawson, Dr. Carpenter, and others, have endorsed the reality of the discovery, to which Principal Dawson has given the name of 'Eozoon Canadense,' or *Canadian early-living creature*. It belongs to the Rhizopods, or *root-footed creatures*—

microscopic existences belonging to the Foraminifera, of which millions are still found at the bottom of the Atlantic. It was, it may be therefore concluded, a form of sea-life.

I must not stop to describe to you the Molluscs—the Brachiopods and Echinoderms, or the early forms of sponges, which have been traced in the Cambrian stratum. I must pass on to one important form, first found in the Cambrian, and becoming extinct in the Carboniferous strata. This was the Trilobite, or *three-lobed* creature. It resembled three small shields joined together, was composed of joints, so that it could curl itself up, and had two eyes. Some of the Trilobites were very small, and some from one to two feet long. From the abundance of their petrifications, it is concluded that they existed in millions, and were the scavengers and master-creatures of the ancient seas, before the creation of fishes, for they are found most numerous in the middle of the Silurian stratum.

Let me draw your particular attention to the eyes of the Trilobite. Each of these eyes had four hundred facets. ‘Facet’ (or *little face*) you have in

the diamond when it has been cut. The famous Koh-i-Nūr, or *mountain of light*, as it means, in Arabic, the priceless diamond which was won in India, and presented to Queen Victoria when she was young, is said to have been so dull—magnificent as the stone was in size—that it did not seem to deserve the Arabic name. The story runs that the ‘Iron Duke’ said to the Queen, “Your Majesty should have it cut into facets.” “I will commit it to your care, if your Grace will undertake to see it done,” said the Queen. And, at once, Wellington received it, and wrapped it in his silk handkerchief. He took it to the lapidary, watched him working, the first time, and then took possession of it again. Thus he watched the lapidary, day by day, always taking the diamond back into his own care,—always ‘the soldier of duty,’ you see,—and safely gave it back into the Queen’s hands. Now, when she places it on her brow, it dazzles the eyes of beholders.

Some of you *who think*, will be asking, “Why had these creatures this remarkable provision?” Perhaps, that no minute object, on any side, might escape their vision in the water. Or there may

have been reasons for such a provision that we cannot penetrate. Our common dragon-fly has 7000 such facets, or lenses, in each eye ; and there is one kind of butterfly which has 35,000 lenses in its two eyes. "What is it for?" is the natural question which is sure to arise in every thoughtful mind, when such information is given to it. But how often we cannot devise the answer to our questions ! I have a little theory of my own about the lenses in the eyes of our beautiful insects. Why should not you and I have our theories, as well as Mr. Darwin ? My theory may be worthless—but it pleases me, and so I'll tell it you.

"God is love." And His love may be manifested to what we deem the meanest of His creatures, in many ways that we cannot discern, in our present state. As the multitude of lenses present objects to the insects in every possible direction, and it may be of every possible dimension, however minute, they may also present the rays of light in every possible variety of colour ; and God may have given to these beautiful creatures, which are clothed with rich and varied colours, and frequent the flowers which His glorious hand has also

clothed with every rich and varied colour, a rapture in the enjoyment of colour which is unknown and inexperienced by ourselves. How we differ in our perception of colour, and in its enjoyment! Some are 'colour blind,' like John Dalton, the great chemist, who would have it that a red and a green handkerchief were of the same colour. What eyes for colour, on the other hand, must have been the eyes of Titian, and Giorgione, and Rubens!

I do not know how many of you share my feeling, but I can't help saying to you that I never enter one of our old cathedrals and gaze on the glorious azure and gorgeous vermilion of some of the old windows without a delight that is inexpressible. Do not you all enjoy the beauty of flowers? A simple marigold, with its glowing orange petals and sweet green leaves, is a sight I never see in spring without a throb of joy. It is recorded of Linnæus, that when he first saw a field of the golden gorse in full flower, he fell on his knees, and, with tears, thanked God for creating such a glorious sight for man. I think I experienced a kindred feeling when I saw a flower which I never saw but once in my life. It was a costly flower, growing

in the collection of one who loves God's beautiful flowers—Mr. Thomas Coats, the philanthropic manufacturer of Paisley. The flower was the *Vanda cœrulea* of the Himalaya mountains; and it is said to be the grandest orchid in the world.

Dean Buckland's intelligent remark, in his Bridgewater Treatise, should not be forgotten.—If an Egyptian mummy, when opened, were found to have a telescope or microscope in its hand, should we not say, "The Egyptians understood optics"?—and can we examine the eyes of the Trilobite, which geologists affirm existed millions of years ago, and deny that the Almighty and All-wise Optician did not then exist?

One more observation about the Trilobites, and we leave them. Geologists have found no mark of a living form from which to argue that they were evolved; and they disappear, in the Carboniferous series, without leaving any mark of offspring, or evolved successors. They are found as having existed during one early period; and they are never found afterwards. A fact of the strongest kind in disproof of Evolution.

Nor is the existence of the Ganoid fishes, as

the earliest found, a less powerful fact disproving the theory of Evolution. Agassiz, the brilliant pupil of Cuvier, delighted his teacher by suggesting a most simple and sensible arrangement of the fishes into four classes : 1. Ganoid (from *ganos*, the Greek word for splendour,) or armed fishes, such as the sturgeon ; 2. Placoid fishes, or fishes with thick rough coverings, like the shark ; 3. Ctenoid fishes, whose scales have edges resembling the teeth of a comb ; and, 4. Cycloid fishes, whose scales are circular. Now, Ganoid fishes are most abundant in the Palæozoic formation ; are fewer in the Mesozoic and Kainozoic ; and we have not now more than nine species of them. The lamented Hugh Miller first discovered petrifications of them in the Old Red ; but they have since been found in the Ludlow limestone and other Palæozoic rocks, as I have already said, abundantly. The Ganoids are the earliest found petrifications of fishes. Geologists have urged that simpler forms of fishes *will* be found, *perhaps*, even in the lower rocks. *But none have been found*,—a fact very unfavourable to the theory of Evolution.

The Placoid fishes were also numerous during

the Palæozoic period, together with large Crustaceans, resembling the king-crabs of the West Indies ; and many petrifications of insects allied to our beetles, cockroaches, ants, centipedes, and scorpions, are found in these early rocks. I must not describe them at length. Let me, however, invite your attention for a few moments to what are called Crinoids, or sea-lilies, one of the most remarkable forms of life during the Palæozoic period. Some of the beds of mountain limestone, some hundreds of feet in thickness, are almost entirely composed of the broken skeletons of these crinoids. They must have been abundant in the early seas. A creature of very simple organisation, resembling a portion of sea-jelly, was gifted by the Almighty Maker with the instinct of collecting, or abstracting, lime from the sea-water, and forming therewith a geometrically-shaped piece of stone, and rooting it in the bottom of the sea. On this it proceeded to form and lay another piece of limestone, and on this another, and so on, till it had raised a tall stone column, with each joint of which it kept up communication by means of two bundles of fibres piercing the centre of the flexible pillar.

The creature then branched off in its workmanship into a number of stone arms of similar workmanship, and thus formed a figure like the cup of a lily. The *Briarean Pentacrinite*—one of these strange zoophytes—was composed of 150,000 pieces of limestone, and was held together by 300,000 bundles of fibres!

“What did God form such strange creatures for?” “Why did He make them?” are natural questions which must arise in a mind which has any capability of thinking. But your lecturer cannot answer these questions; and he knows no mortal man, nor has he ever heard of one, who had the ability to answer them. There must be purpose, even when we cannot trace it, in every part of God’s work. He never works by caprice. How many thousands of things there are around us, how many evident marks of skill and fitness, which thus set us fast! Ought we to be surprised at this? Can we expect, with our imperfect faculties, to comprehend all around us? Do we not know that we comprehend nothing? Let us have a little patience. In the higher state which Christ has promised to us—where *we shall know as we*

are known,—I, for one, confide that many natural mysteries which puzzle us now, will be made plain to us.

The vegetable life of the Palæozoic formation is of higher moment to us than even the mysterious and strange forms of animal life to which we have paid brief attention. Algæ, or sea-weeds, and other simple vegetable forms, we pass by, to note the plants of gigantic growth which, by the combined influences of moisture, heat, pressure, and other, as yet, unknown causes, operating through long ages, have been transformed into coal—the kind of fuel which has become such a desideratum in our modern civilisation. These plants were not what we commonly name and value as ‘flowers.’ They were lower forms of vegetation: horse-tails, club-mosses, ferns: conifers, or cone-bearing trees, were the highest forms among them.

The earth in its hot, steamy state, before the formation of the sun, threw up these lower forms of vegetation into monstrous growths. Nearly two hundred species of fossil ferns, some more than thirty feet high, chiefly polypodies, have been discovered in coal-seams and the shale that sepa-

rates them : horse-tails arranged into a new genus called *Calamites*, of great height, and some a foot in diameter ; and two genera of *Lycopods*, or club mosses, named *Lepidodendrons* and *Sigillaria*, some of them fifty feet high and three or four feet thick in the stalk.

The coal-seams stretch across Europe, from east to west ; are believed to extend beneath the bed of the Atlantic ; and are spread over North America to the slopes of the Rocky Mountains. The lamented Hugh Miller observes that if our earth could have been seen by the inhabitants of another planet during the Carboniferous period of the Palæozoic formation, it must have seemed to be of a perennial green colour, from the abundance of its growth of vegetation.

A believer in Mr. Darwin's theory will see no proof of a Divine Providence in the existence of coal-seams in such abundance. But we who believe in such a Providence see it proven in the existence of iron ore amidst the coal ; in the presence of mountain limestone, too—for lime is necessary as the 'flux' without which the furnace-work could not go on ; and also in the disturbing forces

which raised the coal, and broke it into 'faults,' thus *inclining* it for convenient reach and working by man—the crown of earth's creation whom God had in His beneficent view and regard, while preparing the earth for him.

It is supposed that these vast growths of vegetation subsided, or sank, again and again; that the swamps, where they grew, were silted up, and another growth succeeded; and that this process went on for long ages, until the numerous seams were formed. The roots of the *sigillaria* are often found in one seam, or in the shale, and run up into the seam above, or into the shale above that. Geologists reckon that the Carboniferous period must have lasted more than a million of years.

VII.

THE SECONDARY, OR MESOZOIC FORMATION: ORDER
OF POSITION, AND BRIEF DESCRIPTION OF ITS
LAYERS, OR STRATA.

‘ M ESOZOIC ’ points out the petrifications of what is considered to be the *middle period* life of the earth. One cannot help wondering that the Mesozoic is not considered as beginning with the Magnesian limestone. The marks of ‘ unconformity ’ of which I have before spoken, and which, we are told, led geologists to make their divisions, first, of a great threefold character, begin during the latter part of the Carboniferous period. The Permian or Magnesian limestone lies immediately “ over the bent and denuded edges and surfaces of the Carboniferous strata ”—a proof that great disturbing forces must have been in operation before the Magnesian limestone was deposited. The fact

that few life-forms of animals found in the Permian are found in the Mesozoic seems chiefly to have determined the present order of classification.

The contents of the secondary formation are usually distributed, first, into *three* groups of rocks: the Triassic, Jurassic, and Cretaceous groups: Triassic, meaning threefold; Jurassic, from Mount Jura in Switzerland, because the kind of rocks signified abound there; and Cretaceous, from *creta*, or chalk. The Triassic is again divided thrice: *Bunter Sandstein*, *Muschelkalk*, and *Keuper Sandstein*, the second-named not being found in England, but abounding in Germany. The Bunter and Keuper Sandsteins form, together, what is called—

1. The New Red Sandstone, which covers a large surface in several counties of England. If you place your forefingers at the upper part of the map of England—say, one in Cumberland, and the other about the mouth of the Wear,—then gradually bring your fingers down into the Midlands, and then pass downwards on the western side of England into the heart of Devon, you will mark out the large district over which extends either the Upper and Lower New Red, or the ‘Variegated Marls’

which pertain to it, and which abound in *gypsum*. The Keuper (copper) or Upper New Red is noted for its salt-springs: it is thought that salt lakes abound under it.

Dean Buckland observes that some of the best known towns in England stand on the New Red: Carlisle and York, Preston and Warrington, Liverpool and Manchester, Chester and Shrewsbury, Nantwich and Droitwich, Lichfield and Coventry, Stafford and Wolverhampton, Derby, Nottingham and Leicester, Worcester, Bristol and Exeter.

2. The Lias forms the lowermost part of the Jurassic rocks. It extends from the north of Yorkshire, in a belt lying south-west, to Dorsetshire. It is remarkable as a series of beds for its evenness, and its generally undisturbed horizontal position. Lias slabs are often used for footways, and great quantities of Lias are burnt for use as lime. Iron ore is found in immense masses in the Cleveland hills of Yorkshire, and in a part of Northants, and also near Banbury: all in the Lias division.

3. The Oolite (from *oon*, an egg, and *lithos*, stone) is another division of the Jurassic. It consists of stones of varied character. Some are firm

in texture, and are fine building stones; while the 'fuller's earth' is soft, and the Bath stone is adapted for carving, and is considered equal to Caen stone for ornamental purposes. The Stonesfield slate is also among the Oolites, and the Cornbrash and Forest marble of the west of England. The 'Oxford Clay' stretches over a considerable part of England, from Weymouth to Scarborough, and underlies the boggy surface of the fens, in the counties of Huntingdon, Cambridge, and Lincoln. The Portland stone of which St. Paul's, and Somerset House, and many of Wren's churches are built, and which is so extensively used in the south of England for flagging footways, also belongs to the Oolite, as also do the Purbeck stone, the Wealden clay, and the Hastings sand.

4. The Greensand forms the lowermost layer of what is called the Cretaceous group. "Can any sand be green?" some one may ask. If you see it near Reigate, it is of the most varied colours. But the greensand is commonly anything but green. It resembles, rather, lumps of cinders thrown out of a furnace, for it abounds with iron. The palisades of St. Paul's were made from iron obtained from

the greensand of Sussex ;—or, as it is now affirmed, from the Weald Clay, beneath the greensand. The iron ore was fused with charcoal: coal not being at hand. The Gault—a heavy dark-coloured marl or clay—is found among the greensand.

5. The Chalk, properly so called, is in three layers: the lowermost layer is of a greenish cast, and hard; the middle layer is of a grey hue, and is also hard: it is the subsoil of the Lincolnshire and Yorkshire wolds; the uppermost layer is the white and soft chalk which is converted into whiting: this is the layer which abounds in rows of flint nodules, and which many of you, no doubt, have observed in some railway cuttings. The flints were sponges, in the ancient seas. The sponges—the soft sponges which we daily use—are chiefly *silex*, or flint. In the stalks of flowers and of corn, flint abounds. God can use what seems to us to be the most unlikely and stubborn of all materials to form the most delicate and tender of His patterns of workmanship.

VIII.

PETRIFACTIONS FOUND IN THE SECONDARY OR
MESOZOIC FORMATION.

THE chief petrified vegetable forms found in the Secondary Formation, are Conifers and Cycads : in form, the last-named resembled a pineapple in full growth,—but you must picture to yourself a form resembling a pineapple of very considerable size.

Ammonites are the most peculiar animal form of petrification found in the Mesozoic, and they are peculiar to it, being never found in the Palæozoic or Kainozoic formations. You know them well, many of you, no doubt, as resembling a snake coiled up and turned into stone. Some are small, many of them large : the largest have been found in the Isle of Portland—being nearly five feet in diameter. These ‘chambered’ forms were

tenanted by molluscs living in the sea. The Orthoceras, a form resembling the Ammonite, existed only in the Palæozoic: the Nautilus, which is also a relative of the Ammonite, is found in the recent period.

There is an abundance of fishes found among the petrifications of the Mesozoic, and they are now found with the form of tail common to most of our living fishes—the ‘homocercal,’ in which the fins are attached to the end of the vertebra. In the Ganoid and Placoid fishes of the Palæozoic, the tail was what is termed ‘heterocercal’—the fins being attached only to the upper part of the vertebra, at its end; the sturgeon and the shark, of our day, have this ancient form of tail.

Crinoids, star-fishes, belemnites (a creature allied to the cuttle-fish), corallines, oysters, and other low animal forms, belonged also to the Secondary formation—with numerous insects; and in 1862 the earliest fossil bird was discovered in it. In America, they profess to have found foot-prints of birds of immense size in the New Red;

but it is questionable whether they are not the marks of reptiles.

For this was the great period of reptile life. The Lias stratum abounds with petrifications of huge saurians. The *Ichthyosaurus* will be a figure you have often seen represented in books. It was, as its name denotes, a fish-lizard,—a terrible inhabitant of ancient seas. It was thirty feet long, and had one hundred joints in its vertebra, moved by four huge paddles,—had eyes each as large as a man's head, and in its jaws, which were six feet in length, were two hundred conical teeth. The eyes were not horny, like the eyes of the trilobite, and therefore they are not preserved in the petrification. But round the large cavities of the eye-sockets are circular appendages of bone which could be drawn out—one over the other—so as to give the eyes a telescopic power, and enable this huge creature to see afar off, or into the depths of the sea,—or, the large eyes might be lamps of light, and enable it to see in darkness. The bony appendages round the eye are a similar provision to that of the large birds of prey living in our own time,—birds which have no sense of smell, but are

thus able to see the dead carcase of a horse or an ox, at the distance of several miles,—birds such as the condor, in South America.

While the eyes of both extinct and living creatures thus lead us again to think of God as the Almighty and All-wise Optician, the jaws of the Ichthyosaurus compel us to regard Him as the sovereign Mechanician. For ready seizing of its prey, thick and clumsily-formed jaws would not have helped this destructive creature. So the jaws are slender. But, slender jaws, six feet in length, would have been likely to snap asunder while the animal was seizing some strong crustacean. Did you ever note the springs of a railway carriage or engine, or coach-springs? The Ichthyosaurus has three bones constructed on the principle of such springs, on each side of the under-jaw, to give it the elastic force of a spring, and prevent it from breaking.

Thus God stores His creation, both in the past and in the present, with what we call ‘design and contrivance.’ “Is it not a proof of weakness in God,” I once heard a sceptical advocate say, “that He had to design and contrive in order to

make things?" The question seemed to me to be no proof of the man's ingenuity, but only of his perversity. A moment's real reflection would have taught him that an Almighty and All-wise Being has not to think and think on, in order to design and contrive—like man with his limited intelligence; but that the Almighty and All-wise One stores His creation with these signs of design and contrivance to lead us to the perception of His wisdom and power. It is thus that "the invisible things of Him, from the creation of the world, are clearly seen, being understood by the things which are made: even His eternal power and Godhead."

Plato calls God the Great Geometrician or Mathematician. And who that marks the order, the symmetry, the shapeableness, the delicacy and perfection of adjustment, the exquisite exactness of fittings together of parts, and the unspeakable beauty of finish, in the works of the Almighty and All-wise Architect of this universe can fail to acknowledge the just and true application of the terms used by the great Athenian philosopher?

"But you forget that you raise another troublous thought in our minds by describing this ancient

destructive fish-lizard," says another: "why did God compose His creation of animals to destroy and animals to be destroyed?" I wish I could answer your question fully. But I can only give the partial replies to it that I have often given in your hearing and in the hearing of others, and I need not repeat them here. I wait—with you who share my Christian hope and trust—to have the full solution of the difficulty when, having been unclothed, we shall be clothed upon with immortality, in the heaven Christ has promised to us. I will only say that, with regard to our present life, I never shared the gloomy thoughts of John Stuart Mill. The sum of the happiness of God's earthly creation is, to my mind, unmeasurably over and above the quantum of suffering there is in it.

I must refer you to Sir Charles Lyell's, or other geological treatises, for descriptions of other gigantic fish-lizards of the Mesozoic period—the *Megalosaurus*, *Teleosaurus*, *Stencosaurus*, and *Pliosaurus*; the *Mosasaurus*, which was fifty feet long; the *Plesiosaurus*, with its enormous long neck, in which were thirty-three vertebræ; and, above all, the *Ceteosaurus* (or whale-like lizard), which was

seventy feet long, and of which Professor Phillips placed a grand petrification in the Oxford Museum. Dr. Dawson says that it must have been a land animal. Perhaps the strangest creature of all was the *Pterodactyl*—a flying animal with a head and beak like a bird, yet with sixty conical teeth, immense eyes which are supposed to have enabled it to see and fly by night, and huge wings that must have been membranous.

A word or two respecting the great Chalk strata. The dredgings in the Atlantic, by the naturalists who went out in the ship 'Challenger,' have recently shown that the bottom of the ocean is covered to a very great depth with chalky mud, formed chiefly of microscopical shells of *Globigerina*, and other genera of what are called *Foraminifera*, which, we know, also swarmed in the seas of the Cretaceous period. White chalk is carbonate of lime, and is chiefly made up of the fragments of minute shells—the coverings of *Foraminifera*, chiefly of the genus *Globigerina*. Some of our chalk beds are over a thousand feet, it is said, in thickness. What an idea of the creation of God

is presented to us by such an account! The thought of the incalculable millions of lives of minute creatures, and of their being succeeded, again and again, by still more incalculable millions, in past ages, seems to make us stagger and reel in attempting to form an adequate idea of the Creator's power and its boundlessness.

Geologists say that there was a slow subsidence of a large part of the earth's surface, at the beginning of the Cretaceous period; and, then, a 'crumpling of the crust,' and elevation of the highest mountain ranges—the Himalayas, the Andes, and the Alps, in the Tertiary, or Kainozoic period, that followed.

IX.

THE TERTIARY OR KAINOZOIC FORMATION: ORDER
OF POSITION, AND BRIEF DESCRIPTION OF ITS
LAYERS, OR STRATA.

'KAINOZOIC' denotes the petrifications of
newer period-life. Again, I must remind
you of the 'unconformity' which led men of science
to separate the Mesozoic from the Kainozoic. To
quote the words of a skilful geologist whom I have
the pleasure to name as a friend of more than
thirty years' standing—Mr. Samuel Sharp, the author
of the most perfect 'Rudiments of Geology' in the
English language:—

"The break between the two, as indicated by
the utter change in animal and vegetable life, is so
complete as to be without parallel in the earth's
geological history. . . . Not a species (except some
perhaps of microscopic forms,) whether of Mollusc,

or Cephalopod, or Fish, or Reptile, or Mammal, or Plant, of former periods, has remained: the whole world of life has changed. A vast gulf intervenes, as yet unbridged by science—a lapse of time so great as perhaps to equal that which separates the earliest Tertiary age from our own day.

“Of this great interval, of its physical phenomena, of its life changes, we know nothing. Whole generations and families of living things may have come into being and passed away, continents may have given way to oceans, and oceans to continents, whole ranges of mountains may have raised their lofty peaks, and again subsided into plains, during this mighty hiatus which human knowledge has failed to fill.”

The Tertiary formation has been divided into the ‘Eocene,’ ‘Miocene,’ ‘Pliocene,’ and ‘Pleistocene’ strata, by Sir Charles Lyell; but the Pleistocene is, of late, included under the new term ‘Quaternary’ formation, which is meant also to include the soil which has always been considered as alluvial. Eocene means *early new*, and the other terms mean *middle*, *late*, and *later-new*.

1. The 'Eocene' comprises the London clay, which is visible at Highgate, passes under the metropolis, and reappears in the Isle of Sheppy and the northern part of Kent : it also extends over parts of Middlesex, Berkshire, Hampshire, Dorset and Wilts, Surrey and Sussex, a small part of Suffolk, and the greater part of Essex. In France, the 'Eocene' includes the *calcaire grossier*, and the gypsum beds of Montmartre, in which were found the petrifications of Pachydermatous animals foretold by Cuvier. In the 'Eocene' is also included the Nummulite limestone, which enters largely into the composition of the Alps, the Pyrenees, the Carpathians, and the Himalayas, and some of the North American mountains—while the sphynx and several of the Egyptian pyramids were formed out of it.

2. The 'Miocene' is almost limited, in this country, to Hampshire and the Isle of Wight ; but it is extensive abroad, being found as a thick stratum in Switzerland, France, Belgium, Croatia, and some parts of Germany, Italy, and Greece ; it is also found in the Siwalik Hills of India, and in the United States of America.

3. The 'Pliocene' is found in Essex, Suffolk, and Norfolk, where it is named *Red Crag* and *Coral Crag*; and it is extensive in Italy. The *Black Crag* of Belgium is also held to belong to the 'Pliocene;' and so is a part of the stratum in eastern parts of the United States. In Sicily, the 'Pliocene' covers nearly half the island. Sir Charles Lyell says that "since the accumulation of these beds, the whole cone of Etna (11,000 feet in height, and ninety miles in circumference at its base,) has been slowly built up."

X.

PETRIFACTIONS FOUND IN THE TERTIARY OR
KAINOZOIC FORMATION.

THE vegetable kingdom, in this period, must have been richer even than in our own. Lardner, in his 'Popular Geology,' Hugh Miller, and other practical geologists, give us gorgeous pictures of the flora of the Kainozoic formation. Agassiz, who may be considered a witness of the first rank as to the 'Testimony of the Rocks,' affirms that the botanical order *Rosaceæ*—which includes not only the roses and potentillas, but so many of our edible fruits, the bramble, raspberry, strawberry, apple, pear, quince, cherry, plum, peach, apricot, nectarine, and almond—was one of the last creations of the Kainozoic, or was introduced but a little time before Man appeared on the earth. The polar regions, as well as the tropics, shared

the luxuriance of vegetation, in the Tertiary period.

With the exception of a few petrifications held to have belonged to Marsupials, in the Mesozoic, no signs of the life of Mammalian animals have been discovered till we come to the Kainozoic formation. The petrified remains of creatures allied to every order of animals that suckle their young, except Man, have been found in the Tertiary formation, in our own country: the elephant, rhinoceros, hippopotamus, tapir, swine, horse, ox, bear, beaver, otter, deer, dog, whale, porpoise, and many of the smaller four-footed creatures, have all their representatives among the stony relics of this period. Petrifications of birds are not so numerous as those of mammalian animals. But I must leave you to gather more full and particular information from Lyell and other treatises, in order that I may have a little time to attend to a theory which is of great importance.

XI.

THE GLACIAL THEORY, AND THE GENERAL QUESTION
OF THE AGE OF THE EARTH.

TO be told that there was a period, in the history of this globe, when Scotland to its southern extremity was covered with ice two thousand feet thick, is a cause of great wonderment to people who hear of it for the first time. And the wonder increases when they read that Sir Charles Lyell says, in his carefully constructed book 'The Student's Manual of Geology'—"We are gradually obtaining proofs of the larger part of England, north of a line drawn from the mouth of the Thames to the Bristol Channel, having been under the sea, and traversed by floating ice, since the commencement of the Glacial Period." And when you are told that a large part of North America, and of Norway and Sweden, and Northern Russia and

Denmark, have been, at one time, also covered with this colossal layer of ice, the statement seems startling.

Yet the Glacial or Ice Period is considered to be an historical fact, by very solid deduction from other facts. The formation of glaciers, or immense fields of ice, between two chains of hills, is a familiar sight to tourists in Switzerland. These ice-masses, or glaciers, are slowly but constantly moving, until they melt; and then they leave, all along the middle of their path, a huge heap of fragments of rock, roots and boles of trees, and clay. These long piles of *detritus* are called 'moraines.' Now these moraines are also found in Scotland, between the chains of the Grampians, and also in Sweden, North America, and Northern Russia; and it is argued that they have had a similar cause to that of the Swiss moraines. Immense grooves are also observed on the sides of the Scottish, Swedish, and other mountains; and these are believed to be owing to the pressure and grinding of icebergs.

From these, and other phenomena, geologists conclude that the greater part of our island, Ireland,

Sweden, and the lands I have just named, were at one time covered with ice, at least 2000 feet in thickness. Ireland, they judge, was once one with Great Britain; and Great Britain was one with France, until the occurrence of some great commotion that drove us all asunder. Animals, it is believed, passed southward, easily, as the ice approached, when there were no Straits of Dover—no English Channel. It is also held that they did this several times—for the Glacial periods have occurred again and again, and will again occur, it is affirmed.

Various theories have been formed as to the cause of this marvellous glacial visitation. Hopkins attributed it to “variation in the intensity of the sun’s radiation.” Another theorist held the cause to be “the passing of our solar system, alternately, into cooler and warmer space.” Sir John Lubbock tells us that his father held that the glacial visitation was caused by an alteration in our Earth’s axis, arising from upheavals and depressions of great magnitude on its surface. A fourth theory is that the Glacial period occurred when the gulf stream had not yet warmed Europe. A fifth theory

maintains that the Sahara, or great African desert, was formerly a part of the Atlantic—when the *Fohn*—the dry, burning wind which now strips the snow from the Alps, would be a moist, damp wind, under which snow and ice would not melt.

In spite of Sir Charles Lyell, who holds that the Glacial period occurred 800,000 years ago, and of Sir John Lubbock, who contends that it was 200,000 years ago, a sixth theorist—M. Adhemar—maintains that the great Ice visitation depends on what is called ‘the Precession of the equinoxes,’ which takes 21,000 years for its accomplishment. M. Adhemar is confident that only 11,120 years have passed since the last Glacial period; that the climate of our northern hemisphere had been warmer up to A.D. 1248—now 630 years ago; that it has been cooling since that time; and, of course, that the frightful Glacial period will return in another 10,000 years. Though none of us will be ‘in the flesh’ then, yet a return of such a visitation is not pleasant to contemplate.

But where theories are so various,—although the theorists are, each and all, considered to be ‘experts’ in the geological or other scientific

line—one cannot regard the return of the Glacial period as a coming event of complete certainty. And it is for the same reason—that is to say, the diversity of opinion among men of science, that we can come to no settled opinion respecting the age of the Earth. Sir Charles Lyell held that two hundred and forty millions of years have elapsed since the beginning of the Cambrian period—while Mr. Darwin thinks that “a far longer period than three hundred millions of years has elapsed since the latter part of the secondary period”—that is to say, since the existence of the higher Chalk stratum, a calculation that would lead one to suppose Mr. Darwin would date the beginning of the Cambrian period a billion of years ago ! Other naturalists and geologists maintain the same high rate of figures respecting the age of the Earth.

The positive denial given by our great mathematicians to the truth of these high figures is remarkable. The theory of Helmholtz—that the sun has been formed by a nebulous revolving mass, filling a space far greater than that of the solar system, and condensed by the attraction of

gravitation,—is held to be the most probable theory as to the source of the Sun's heat. Now, as the Sun radiates his heat to the bodies of the solar system, it is argued that he must be cooling ; and that he cannot have been giving out his heat at the same rate as at present for more than a *few* millions of years. Therefore, reasons Sir William Thomson, who is said to be the first mathematician in Europe, “the existing state of things on the earth, life on the earth, and all geological history showing continuity of life, must be limited within some such period as a hundred millions of years.”

Professor Croll cannot grant so much. He would reduce the hundred millions to forty millions. But Professor Tait is inexorably disposed to be cruel with Mr. Darwin and Sir Charles Lyell. He sets aside their teaching about hundreds of millions for the existence of life on this earth, most unceremoniously, declaring that physical considerations render it impossible that more than *ten* or fifteen millions can be granted ! About ten millions of years ago, it is contended by this new school of calculators, the surface of the Earth had just been consolidated ; and, after a few thousand years

would be so far cooled as to permit the beginnings of life. But if we go back a hundred millions of years, the Earth—*if it existed at all*—must have been in a liquid white heat, and unfit for any kind or form of life that we are acquainted with. Amidst such conflicting opinions of the highest men of science, we are still ‘at sea’ as to the age of our Earth; and think that even such very wise men would have been wiser if they had held by the opinions of some of the older geologists, that the facts of geology *give no evidence as to time*.

We can only hold by the conviction from the repetition of tropical and temperate climates evident from the layers of the Earth, even in our own country,—from the fact, which cannot be doubted, that sea has often been land, and land been sea, in the past; and that upheavals and submersions of land go on very slowly, in our own time,—that only immense periods of time will account for it all.

One question will have been in the minds of many of you while I have been talking: Is what we are listening to in consistence with the teachings of our Bible? Nor will another question have

been forgotten: What about man? While you have been affirming that petrifications of the creatures, from an insect to an elephant, have been found in countless numbers, reckoning the Primary, Secondary, and Tertiary formations together,—has no petrification of a human form been found in any of them?

I purpose giving you distinct and unhesitating answers to these important questions to-morrow night.

THE MOSAIC RECORD OF CREATION.



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THE MOSAIC RECORD OF CREATION.

I OPEN the Bible at the first chapter of Genesis, to-night,—a somewhat novel proceeding for a lecturer,—because I have undertaken, as a first duty, to show that what we call ‘The Mosaic Record of Creation’ is *not* disproven by modern discovery. I do not undertake to show that this first chapter of Genesis is in accordance with all the fanciful theories of Mr. Darwin, or all the wild calculations of Sir Charles Lyell. But I do mean to show that it is perfectly reconcileable with what is called the Nebular Theory of Laplace, with Sir Isaac Newton’s doctrine of Gravitation, with the intelligent theory of Helmholtz respecting the source of the Sun’s heat, and with all the *true* teachings of Geology.

I.

AUTHORSHIP OF THE PENTATEUCH.

A FEW preliminary words, please, as to what we mean when we call these ‘The Five Books of Moses.’ We often mention a book as the work of one man, while, at the same time, we know that a part, or parts, of the book are not to be really accounted as his. Now, we cannot mean that Moses wrote every part of these five books—for the death of Moses, and also his burial, are recorded in the last chapter of Deuteronomy—and Moses could not make that record. The phrase “as it is unto this day,” which is often met with in these books, also shows that a later hand than that of Moses has sometimes been employed in them. The Jews, doubtless, give us the true tradition, when they tell us that Ezra ‘the scribe’ inserted this phrase, when new copies of the Torah,

or Law, were written out for the use of many who had been born in captivity, and were strangers in the land of their fathers.

You will remember the excitement Colenso raised in this country a few years ago, by trying to popularize among us the German theory about ancient Elohist and Jehovistic documents having been clumsily dovetailed into one, by a later writer, to form this Pentateuch. Colenso told us that he believed that writer to be the prophet Samuel—though he had no more authority for his belief than he had for attributing this imaginary dovetailing to Balaam's ass, if the whim had seized him to do that. The attempt by the Bishop of Natal to destroy our faith in the genuineness and authenticity of the first five books of the Bible was a miserable failure. We still hold that there is the Divine stamp upon them; and yet we discern what we consider to be strong evidence that several of the opening chapters of the Pentateuch were not, originally, the composition of Moses,—although we do not doubt that they were arranged in their present order by his hand. They are, evidently, short documents by different authors.

Our first chapter of Genesis, and the first three verses of the second chapter, form one independent and general account of the Creation : in it, the Creator is called by one name—*Elohim*, which is a plural word, and whenever it is used to designate God, it is united to a singular verb—in order, as we believe, to express the act of the Triune Deity. The second independent document begins with the fourth verse of the second chapter, and closes at the end of the third chapter : in it the Divine Being is described by two names—*Jehovah Elohim* ; and, now, a more particular account is given of the creation of Man and Woman, and of the primal temptation and fall of our first parents. The third independent document consists of our fourth chapter : and in it the Divinity is named by one word—*Jehovah*. Many of you, no doubt, are well acquainted with all this ; and you also know that there are marks of independent composition in several of the chapters following.

I beg to state to such of you as may not have heard of it, that, respecting the authorship of these chapters, there is a very probable theory held by Christian men of high intelligence and large Hebrew

learning. It is, that these short, independent documents, and also some longer records which follow them, were composed by the early Patriarchs ;—were preserved in what may be called ‘the Sacred Family’—the family from which Messiah should, in due time, be born ;—were handed down, through Abraham and his descendants, to the heads of the tribes, in Egypt ;—and thus came into the possession of Moses, who prefixed them, in the order in which they were composed, to the larger work on the Exodus and Wanderings of the Children of Israel, and on God’s dealings with them, which the Jewish legislator and leader himself undertook and performed. The first short document is, no doubt, derived from Adam himself : the other documents are held to have had Seth, Noah, and others, for their authors.

No amazement ought to be felt when it is maintained that this short, general account of the creation, contained in this first chapter and three verses of the second chapter of Genesis, is the work of our great progenitor Adam. Who was more likely to feel curiosity as to his own origin, and the origin of all things around him. than the

first man? To whom would his Maker be so likely to impart the positive knowledge that would satisfy his own curiosity, and also enable him to give the right knowledge to his descendants, as to the first man—the head of his race?

But *how* was this knowledge imparted to Adam? it will be asked. Our Milton, you know, represents 'the affable archangel,' as he calls Raphael, delighting our great forefather by giving him the narrative of Creation. Revelations of a supernatural character are, however, represented, in Scripture, as made by vision. With all my love and reverence for the great soul of Milton, I cannot help, therefore, concluding that this supernatural revelation—for it cannot be called 'history,' you know—was made to Adam in a series of visions occupying the 'evening' and the 'morning' of six successive days of Adam. Another important question now arises—Were the 'days' of Creation like Adam's days and our days?

II

WHAT WERE THE 'DAYS' OF CREATION?

I NEED not remind you of the many names of religious writers who hold to the notion that the Creation-days were each twenty-four hours long. I imagine your own reading of this first chapter of Genesis must have shown you that the word 'day' is used in two senses, in one verse—the fifth: first, to denote the light, and then to denote the evening and morning joined. In the fourth verse of the second chapter, 'day' is used to describe the whole period of Creation. So there are *three* meanings to the word within a small compass.

The phrase 'as it is unto this day,' already mentioned, gives a fourth and looser meaning. The fact is, that the Hebrew word 'yōm' is just as variable in its uses as our word 'day,' or any

word in any other language which is commonly used for a day. So that no reason for making each period of Creation consist just of twenty-four hours can be founded on the common use of the word.

That there could be no day of twenty-four hours before the formation of the Sun—which the sacred record declares was not before the fourth day—needs no argument to prove. One writer, fearful of losing his reputation for orthodoxy, strove to persuade his readers that all which Geology shows us has really occurred in the history of the earth, should be placed between the first and second verses of this first chapter of Genesis; and then we should understand the remainder of the chapter as relating to the entire re-arrangement of things in six days of twenty-four hours each, just before man's creation. No such preposterous theory can be maintained now. What Cuvier, and De Luc, and Jameson, and Hugh Miller, and others, fearlessly taught from the first, meets with few sensible and well-informed objectors at the present time. That the term 'day' is to be taken as meaning *a period* to which

no man of science, however great his reputation, has a right to assign any *definitive* duration—is generally received as a truth—a settled fact—in our own ‘day.’

“A settled fact”—some of you will whisper—“settled facts are often sorely unsettled, you know.” Just so : and I do not wish to say you are not to think about it. But, I respectfully remind you that, when a clear and sensible reconciliation of Science with Revelation is offered, there can be no worthy reason for rejecting it.

III.

RECORD OF CREATION : THE FIRST DAY.

LET us now enter on the reading of the record. I shall have to mention Hebrew words to you, to-night. But I beg of you to understand that I do not profess to be a profound Hebrew scholar. I have had too many things to learn, in order to teach others ; and my life has been too full of vicissitude to admit of my becoming profound in the knowledge of any language. Those of you who have read the humble story I have given of my own life know that, fifty years ago,—while bending over the last and wielding the awl,—I taught myself the elements of Hebrew, Greek, Latin, and French. I have no time, now, to look into a Greek classic ; but I read my Greek Testament every morning of my life—unless I have to travel very early,—and I always read sweet John

first. He brings the Saviour so near to me, that I must converse with him first. My busy life also demands that I confine myself nearly to one Latin book ; and so I always carry my Latin Virgil about with me, to keep up my acquaintance with him. As for French, one meets it, more or less, every week, in books and periodicals : nor would I have you think that I forget my Hebrew. Yet I shall trouble you very little with it, and only from necessity shall I use it, to prove myself in the right.

Berashith bara Elohim eth hashamayim we-eth haaretz—begins the record. “In beginning created Elohim the heavens and the earth.” “In beginning,”—not “In *the* beginning.” There is no definite article ; and the great majority of Hebrew scholars maintain that it is omitted on purpose. No definite time is signified. The word ‘beginning’ is to be taken for indefinite previous duration, or previous eternity.

The vulgar notion is that the Bible says our Earth has only existed about 7000 years ; but there is no such statement in the Bible. The Bible does not fix the age of the Earth, at all. Dr. Chalmers, and Dr. Vaughan, and Dr. Hamilton, and Thomas

Binney, and many modern divines, as well as Dear Buckland and Sedgwick, have stated this fact; and Origen and Augustine, among the ancient Fathers, and even our own Venerable Bede, maintained it.

But in what state did God create the heavens and the earth? The answer is—*We-haaretz hayethah thohu wa-vohu we-choshek alpenei thehōm*. “And the Earth was without form and void, and darkness on the face of the deep.” There was no Earth, in the proper sense of the word. It was not formed. The matter of the Solar System was in the form of cosmic vapour, according to the theory of Laplace—which, I tell you plainly, I hold to be a true theory, and wish I had more time to give you all the reasons for my belief.

Our progenitor's opening vision is that of the formless mass of matter with darkness lying upon it; and, next, it is related—*We-ruach Elohim mera- chepheth al-penei ha-mayim*. “And spirit of Elohim brooding on face of the waters.” I do not fear to tell you my own conceptions. You can receive them, or smile at them, as you please. But I think I have Milton on my side in what I am going to

say. Remember, *he* was a real Hebrew scholar—he who says,

“Thou from the first
Wast present, and with mighty wings outspread,
Dove-like, sat'st brooding on the vast abyss,
And madest it pregnant.”

My conception is, that Adam saw the image of a dove brooding on the cosmic vapour—just as John the Baptist saw the image of the dove descending on Jesus; and, as the Divine influence showed John that *that* was the sign he had been inspired to look for—so the Divine influence informed Adam that what he saw was a sign that God, having first created matter, was now about to *form* it, according to His own all-wise purposes. *Wa-yomer Elohim yehi aur; wa-yehi aur*—are the words that follow: “And said Elohim, Let there be light, and there was light.”

When the Divine command had been made perceptible to Adam, he sees the vaporous mass begin to revolve, and to condense—for God has instituted motion and gravitation by His command; and, from the collision and pressure together of the revolving and condensing particles, heat arises,

and, from heat, what Laplace calls 'the Cosmic Light.'

We may feel sure that if Voltaire had lived in the time of his great countryman, Laplace, he would not have imitated Celsus, the sceptic of the second century, in laughing at the idea of light existing before the sun existed. Let me beg of you to keep in mind that the illustrious author of the *Mecanique Celeste*, unfortunately, was an atheist. It was his science—not his unbelief—which compelled him to maintain that light existed before the sun, and thus corroborate the truth of Biblical science.

The narrative proceeds: "And God saw the light, that it was good; and God divided between the light and between the darkness. And God called the light day, and the darkness He called night." That is to say, God taught man ~~so~~ to call them. For I hold—and it is not a new theory, nor a theory of fools—although your Ape-theory people will laugh at it—that God taught man language. And in teaching the creature He had made, God would teach Adam something worth knowing and retaining in mind: to connect light and day with purity, and uprightness, and truth, and the beauty

of holiness ; and darkness and night with impurity, and disorder, and confusion. The dividing of light from darkness has, thus, a great meaning.

Wa-yehi erev wa-yehi voget yōm echad. "And was evening and was morning day one," concludes the narrative of Adam's first vision, and of the first period of God's creation. The evening or night disclosed the vision of chaos—of matter in its elemental form of atoms and molecules, or cosmic vapour ; and the morning or day showed the mass set in motion—gravitation instituted—and heat and light produced, at the Divine command. I humbly conceive that the scriptural narrative of Adam's vision shows us God's mode of working was such as to lead us to see nothing objectionable in the Nebular or Cosmical theory of Laplace. "We shall be better able to judge of that as you go on," I think I hear some of you saying, who do not like to be in a hurry in coming to a conclusion. You are quite right. Only, I beg to assure you that I have not come to this conclusion in a hurry. I am venturing to give you, to-night, the result of the silent thinking and busy reading of years. But we will proceed.

IV.

RECORD OF CREATION : THE SECOND DAY.

THE second day of creation must be considered as consisting of an 'evening' and a 'morning,' like the first day. And we are still to regard each vision as occupying a part of a night, and a part of a day, of Adam. The beginning of each vision, or that which occurred in one of his nights, it seems natural to conclude, would not seem to relate so nearly to what concerned Adam and his race, as the latter part of the vision, or that which was presented to him on a part of one of his days—although the night-vision might, in some instances, represent a period of longer real duration than the day-vision.

The second *erev*, or 'evening,' would not be a representation of complete darkness, like the *erev* of the first vision ; for the 'cosmical light' would

not grow dimmer, as the condensation of the 'revolving fire-mist' proceeded. But it would be a vision of conflict and rapid change—or what to Adam would seem like disorder, and would, therefore, be a period of partial darkness. The nebular theory presents us with what we cannot hastily reject, as the likeliest picture of this second *erev*, in Adam's vision: separation of a succession of rings from the revolving and condensing mass of matter—their breaking up—and then the re-union of parts of them to form planets, and of other parts to form rings round the planets, and which would eventually become moons. When the rings from which Neptune, and Uranus, and Saturn, and Jupiter, and the planet which may have been severed into Asteroids, and Mars, had been separated—the ring from which our earth was to be formed would, next, become separate.

When the ring had broken up, and parts of it had been united, an intensely heated mass—as the great Leibnitz said, in Newton's time, and our Phillips and modern geologists adopt his idea—would form the primal nucleus of our Earth. And as its unbroken spherical surface cooled, the vapour

around it would cover it with water—so that it would have the appearance of a watery ball. This is also the conclusion of modern geologists; and this would be the appearance of our Earth at the close of the first half—the *erev*—of Adam's second vision.

You may exclaim, "But the Bible says nothing about all this!" True. It only says there was an *erev*; and the 'evening' must have presented something to Adam's sight. The impression made on his mind, in each vision, would be most vivid and durable, where he has to give the picture of what he beholds to his descendants. His communication to them cannot consist of too many details: that would destroy the very purpose of the record Adam has to furnish: it would cause it to be neglected and forgotten.

The record will have to be often repeated, and kept before the eyes, and in the living memory, of the Sacred Family, to preserve them from the sun and moon and star worship, and the animal worship, which grew up so early among the deserters from that family. It must, therefore, be a digest of what Adam saw, and not a full account, involving

a multitude of details difficult to keep in mind. So it told the Sacred Family, *not* that matter and its forces were eternal, but that God created matter—gave existence to it—and then instituted its forces. Adam's descendants were not to worship matter, or any of its forces or its forms: the Creator of all was to be the sole object of their worship.

The 'morning' of Adam's second vision is thus related in our translation: "And God said, Let there be a *firmament* in the midst of the waters, and let it divide the waters from the waters. And God made the firmament, and divided the waters which were under the firmament from the waters which were above the firmament. And it was so."

The new translation, which is now being made by a company of learned men, will abolish the word *firmament*, for such a word—which has been the cause of so much adverse criticism—should never have been used in this verse. The Hebrew word *raqia* means 'expanse,' or something spread out.

"How came the wrong translation to be made?"

you will ask; and I have to reply that it was caused by men's ignorance of true science. St. Jerome,—the author of the Latin translation, called the Vulgate, which is used by the Romish Church,—had the Septuagint before him, as well as the Hebrew text, and coined the word στερέωμα into *firmamentum*—both words signifying something solid or firm; and our translators, three hundred years ago, cut off the *um* at the end, and gave us *firmament*. For the authors of the Greek and Latin translations, as well as our good old forefathers, were all believers in the blundering system of ancient astronomy which made our poor little Earth the centre of the whole universe, and placed a solid dome, or *firmament*, over us, beyond the orbits of the planets.

Our business is not with the correction of the blunder, in the translation now being formed. We hope we can leave that safely to the men who have undertaken to give us—so far as they can agree—the most correct English version possible of the revealed Word of God. Yet we must correct the blunder for ourselves. We must remember that there is no account of a *firmament* really in the

Bible. Carry the word 'expanse' in your mind, as you read, and you will always find it agree with descriptions of the heavens, in the Bible.

What was it, then, that God made, and which was first beheld by Adam, during the 'morning' of his second vision? The Atmosphere: "the blue ethereal sky," as we have it in Addison's fine hymn; and it divided the waters which covered this earthly ball, from the vapours which still surrounded it, and which, by a further transformation, might contribute to form a satellite.

We are told that God called the expanse *Heaven*,—that is to say, He taught man so to call it. In order to remind man, when he looks upward, that this Earth is not the sole corner of existence; that when he thus gazes into the clear regions of space, he may remember that in those regions are the abodes of higher existences, to whom he is to regard himself as related, and whose happy company he may join, when his pilgrimage here is ended.

Wa-yehi erev, wa-yehi voqer, yōm sheni—"And was evening and was morning day second" is the formula with which the account of the second day's creation ends.

The vision of Adam occupied him, as before, only for an evening and a morning of his own day ; our 'natural day,' as we call it. But how long was the real period of the second day's work of the Creator, as represented to the first man, none of us can possibly know. It may have been thousands, or even millions, of years ; but no man, however skilful in science, has any right to affirm, or to pretend, that he can make a probable reckoning of its exact duration.

V.

RECORD OF CREATION: THE THIRD DAY.

THE creation-work of the third day, alluded to in the 9th, 10th, 11th, 12th, and 13th verses of our translation of the first chapter in the Bible, seems to be divided into two parts: the work of the *erev*, or 'evening,' and the work of the *voger*, or 'morning.'

Taking up the theory of Phillips, accepted by the geologists of the present time, at the point where we left it,—that the hot nucleus of the earth had been formed, and then, its unbroken spherical surface cooled, and entirely covered with water,—we proceed to the remainder of Phillips' theory. The nucleus, in the process of solidification, would shrink; and the shrinkage would cause rents in its surface. Into these fissures the surrounding water would enter; and a

great force of steam being thus generated, the first great breaking up of the earth's crust would occur, and the early Palæozoic rocks and seas would be formed. The work of the *erev* would thus again seem, in Adam's vision, a period of conflict, change, and disorder; and such change would cause an obscuration of the cosmic light, and thus the *erev* would, again, be a period of partial darkness.

The work of the *erev* is thus described in our translation: "And God said, Let the waters be gathered together from under the heavens unto one place, and let the dry land appear: and it was so. And God called the dry land earth, and the gathering together of the waters called He seas: and God saw that it was good." The dry land appeared: the Earth was no longer a seeming watery ball: it was now land and water; and "God saw that it was good:" it was fitted for the support of the varied forms of life with which His wisdom and beneficence purposed to store it, successively, in the future.

I do not see why the creation and growth of algæ and zoophytes—the creation and multiplica-

tion of trilobites, and then of ganoid fishes, and the gradual transformation of ocean beds into rocks—should not be understood as going on during the third *erev*. I know that many have a strong objection to grant this, and to say that none of this is recorded in the Bible, although geology shows us that animal life abounded before terrestrial plants grew. And in order to meet this objection the leading American geologists are contending that it is most probable terrestrial plants *did* exist before the beginning of animal life—for the Laurentian rocks, which they are now calling ‘Eozoic,’ are composed very largely of *graphite*, a mineral which is chiefly carbon, and that may have been supplied by the grinding up of an immense growth of primeval vegetation.

The American geologists would thus allot the formation of the Laurentian rocks only, to the third day’s creation. I humbly prefer to hold, with Hugh Miller, that the whole range of Palæozoic rocks were formed during the third *erev*—were formed from upraised ocean-beds on which had rested the waters wherein lived, not only such Rhizopods as the *Eozoon Canadense*,

but the immense crowds of Articulata and Mollusca which the Stone Book shows us existed in that ancient period,—together with the swarming Trilobites and multitudinous Ganoid and Placoid fishes.

They are not mentioned in the sacred record for the reason I have already given, in answer to the like objection: it would have destroyed the purpose of the record, if it had been crowded with limitless details: Adam's descendants could not have familiarised their memories with it, so as to preserve in their minds a dread of false and idolatrous worship, and a fear of departing from the Living God.

The work of the third *voger*, or 'morning,' is described in the words that follow the passage already quoted: "And God said, Let the earth bring forth *grass*, the herb yielding seed, and the fruit tree yielding fruit, after his kind, which hath its seed in itself, upon the earth: and it was so. And the earth brought forth *grass*, the herb yielding seed, after his kind, and the tree yielding fruit, which hath its seed in itself, after his kind. And God saw that it was good."

The Hebrew word *déshe* is not properly translated *grass*. It means vegetation, or herbage. The whole passage evidently points—as noble Hugh Miller has so eloquently shown—to the gigantic horsetails, ferns, club-mosses, and conifers thrown up by the hot and steaming earth, in the Carboniferous period. I see nothing valid in the objection that the conifers are not fruit trees. Not according to strict botanical nomenclature, I grant; but the cones and berries of the pines, araucarias, yews, and junipers may be termed fruit without any monstrous violation of language. The Stone Book, on its carboniferous pages, contains the natural record which has its inspired parallel in the eleventh and twelfth verses of this chapter: the record of the creation-work of the third ‘morning.’

Do not let me omit to call your attention to the peculiar expression “after his kind,” which follows the mention both of the “herb yielding seed,” and of the “tree yielding fruit.” God created each “after his kind.” He did not create a single primordial plant, and let ‘natural selection’ form the other plants out of it, according to Mr. Darwin’s notion, in the ‘Origin of Species.’ God

created each "after his kind:" the various kinds, or species, of plants were *His* creation: they did not come into existence by 'natural selection.'

Wa yehi Erev, wa yehi Voger, yōm shelishi,—"And was evening, and was morning, day third," ends the record of the third day's vision. The formula is repeated, and we see formula in other parts of the record: a very evident sign that it was intended to be committed to memory, and often rehearsed.

Geologists hold that the atmosphere, when it was first formed, contained carbonic acid as a much larger component than it does now. The Maker so furnished it, that the gigantic plants of the coal measures might have their nutriment. His beneficence was thus storing up the supply of fuel for His crowning creature, Man, in the future; while, by the abstraction of the carbonic acid surplus, He was preparing the atmosphere for the breathing of animals which were next to appear on the earth and in the waters.

The sacred narrative, at the next step, will leave the Earth; but we may hold that, while it treats of the formation of other bodies, on the fourth day,

the growth upon growth of the coal-seams may be considered as going on, also on the fourth day—and thus a long period be occupied with the carboniferous strata, as geologists contend.

The 'evening' and the 'morning' of the third day's creation-work may each have extended through many thousands of years' duration. But I repeat, no man, however high his scientific reputation, has any right to attach any *definite* time to either period.

VI.

RECORD OF CREATION : THE FOURTH DAY.

PRECEDING the 'morning' of the fourth day's vision of Adam, there would be an *erev*, or 'evening'; and it would be, like the evenings before it, a period of conflict, change, and seeming discord, and therefore of partial darkness, notwithstanding the increasing light of the great condensing or gravitating mass of cosmic matter.

Pursuing the teaching of the nebular or cosmical theory of Laplace, we depicture to ourselves what would form the first half of our great progenitor's fourth vision : separation of the rings which are to form the planets Venus and Mercury ; and then the breaking up of these rings, and formation of the two planets. The cosmic vapour around the earth and its 'expanse' would also have formed a

ring, and have broken up and formed our moon. Its heat would be comparatively little ; and when its body had cooled, it would become what it is held to be now—a mere burnt-out cinder, and in itself dark.

But the most appalling conflict of matter and its forces Adam would behold on that fourth *erev*, would be the final condensation and pressure of so great a mass of cosmic matter to form the Sun—a mass which is more than a million times larger than our Earth. I have said *final*, but the word must be corrected. According to the enlightened teaching of Helmholtz, the condensation is never complete : the pressure continues, and it is the chief source of the Sun's continued heat. The contraction of the Sun only a ten-thousandth part of the length of his diameter, Helmholtz calculates, would generate heat to last through two thousand years of radiation.

Sir William Thomson, and Mayer, and Norman Lockyer, and others, conjecture that meteoric bodies are also almost incessantly falling into the Sun, and thus contributing to feed his fire,—that fire of which we receive but a small proportion,

and yet it keeps up the life of nature through the almighty and infinite energy of Him who is the source and sustentation of all life. Read Mr. Proctor's grand volume on the Sun ; and if it does not fill your minds with reverential awe for the Divine Creator, I know not what will.

When the conflict had been withdrawn from Adam's vision, he would be shown the moon, the earth, and the planets, lit up by the splendour of the sun. And the fourth morning would show him the great offices the Sun sustains in Nature.

Allow me to give you a more literal translation than that of our present authorised version, of verses fourteen to nineteen, inclusive, of this first chapter, in order more clearly to show how accordant the sacred narrative is with the real teachings of science :—

“ And said Elohim, Let there be light-givers in expanse of the heavens, to divide between the day and between the night ; and let them be for signs, and for seasons, and for days, and years. And let them be for light-givers in expanse of the heavens to give light upon the earth ; and it was so. And made (*not* created,—‘ made ’ or ‘ formed ’)

Elohim two the light-givers: the light-giver the great for ruling the day, and the light-giver the lesser for ruling the night: the stars also. And set them Elohim in expanse of the heavens, to give light upon the earth, and to rule over the day, and over the night, and to divide between the light and between the darkness: and saw Elohim that it was good." And then follows the formula—*Wa yehi Erev, wa yehi Voqer, yōm revīz*—"And was evening, and was morning, day fourth."

You will have marked the fitness of the term 'light-givers.' It is such a literal translation of the Hebrew *meoroth*, that it is a wonder our old translators missed it. You will have observed, too, how *accidentally*—shall I say?—"the stars also" seem dropped into the narrative, as if it were meant to teach that they were all made by God, but not all on the fourth day of creation. Some learned men think that the planets only are pointed out in the words *ha-kokkavim*, rendered 'the stars.' For the vision of the fourth day is, evidently, a revelation to Adam of the completion of the solar system. The record, at the next step, returns to our Earth.

VII.

RECORD OF CREATION : THE FIFTH DAY.

AS before, there would be an *erev*, or 'evening,' to commence our first parent's vision of the fifth day's creation-work. That *unconformity* on which geologists insist, between the rocks of the Primary and Secondary formations—the 'faults' and distortions of the Carboniferous strata, and the strange dolomite forms of the Permian, indicate the conflict and change and seeming disorder, and therefore partial darkness, of the first half of Adam's fifth vision : the passage from the Palæozoic to the Mesozoic formation.

Of the *voger*, or 'morning,' that followed, the chief feature of creation-work on the fifth day is recorded in verses twenty-one and twenty-two of this first chapter of Genesis. There are no details of the growth of gigantic cycads and conifers, or

of the multitudinous existence of ammonites and other molluscs, in the Mesozoic. The record is not crowded with countless particularities which would have rendered it difficult to remember, and therefore unfit for frequent rehearsal. It points emphatically to the reptile life—the great dominant life of the Mesozoic formation, which has often been termed ‘the reign of reptiles.’

Poor Hugh Miller was assailed as misrepresenting the Geology of the Mesozoic, in order to fit it for proving the truth of this fifth day’s record. But he never denied that some petrifications of small reptile life—beginnings of it—had been found in the Palæozoic. He simply maintained, what nobody can deny, that the Stone Book proves reptile life to have been the dominant life of the Mesozoic, and that only in that formation was it abundant.

Our old translators have again followed the Septuagint, which gives us *κῆτοι*, ‘whales,’ instead of translating the Hebrew *taninim* ‘reptiles,’ as it ought to be translated. They seem to have been really puzzled with the translation of this word, for they have rendered it ‘dragons,’ again and

again,—applying it, sometimes, to the ‘dragon’ of the Nile, the crocodile,—a plain proof that they must have doubted the correctness of the Septuagint version ‘whales,’ although they had followed it. Doubtless, by *ha-taninim ha-gedolim*, ‘the reptiles the great,’ the huge saurians of the Mesozoic are pointed out with the clearness of a sunbeam. *Oph kanaph*, or ‘fowl of wing,’ may include the Pterodactyls, as well as birds—*toothed* birds with feathers, of which petrifications have been found in the Mesozoic.

The prevalent life of colossal destructive creatures, such as the Ichthyosaurus, Plesiosaurus, and the other great fish-lizards, is a part of the greatest of all problems—the mystery of evil—which none of us will ever be able to solve, in this life. This record assures us that “God saw that it was good.”

The formula *Wa-yehi Erev, wa-yehi Voger, yōm chamishi*—“And was evening, and was morning, day fifth,” concludes the narrative of the fifth vision of the first man.

VIII.

RECORD OF CREATION : THE SIXTH DAY.

“IT is almost unnecessary to say,” says Principal Dawson, in his valuable new book, ‘The Origin of the World, according to Revelation and Science’—“this period corresponds with the Tertiary or Kainozoic era of geologists.” So, the great Canadian man of science does not, in this instance, dissent from the judgment of Hugh Miller.

“Perhaps no geological change is more striking and remarkable,” continues Dr. Dawson, “than the sudden disappearance of the reptilian fauna at the close of the Mesozoic, and the equally abrupt appearance of numerous species of large mammals, and this not in one region only, but over both the great continents, and not only where a sudden break occurs in the series of formations, but also

where, as in Western America, they pass gradually into each other."

That *unconformity*, which all geologists thus affirm to be so strongly characteristic of the passage from the Secondary to the Tertiary formation, would present to Adam a resemblance of the seeming disorder which marked the passage of the Primary to the Secondary ; like it, it would partially obscure the new light of the Sun ;—and would occupy the *erev*, or 'evening,' of Adam's sixth vision.

The *voqer*, or 'morning' of the sixth day's creation-work, is revealed in the twenty-fourth to the thirty-first verses, inclusive, of this chapter ; and is also revealed in the Kainozoic pages of the Stone Book—save that no human petrifications have been found in it.

A few Marsupials—the lowest form of mammals—lived during the Mesozoic, but none of the higher forms. In the Kainozoic, as depicted in Genesis, *Behemah*, or 'cattle,' are mentioned first : the word is chiefly employed in the Bible to denote what are called herbivorous animals ; and they are creatures whose petrifications are most abundant in

this formation : gigantic pachyderms, allied to the Tapir, the Hippopotamus, the Rhinoceros, and the Elephant. Nor are other forms of the thick-skinned animals wanting : the modern Horse, and Swine, have their representatives, or allied forms, also in the Kainozoic.

The word which is translated 'creeping thing' may have reference to the Serpent forms whose petrifications are found in the Kainozoic, and also to the abundance of Turtles. "More species of true turtles," says Owen, in his 'Palæontology,' have left their remains in the London Clay, at the mouth of the Thames, than are now known to exist in the whole world ; and all Eocene *chelones* (tur'les) are extinct."

'The other term—'beast of the earth,' as it is here rendered, is held to describe carnivorous creatures ; and the Lion, Leopard, Bear, Hyæna, Wolf, Dog, Fox, Otter, and other flesh-eating creatures—but all of different species as compared with ours—have all their allied forms in the Kainozoic.

"After his kind," and "after their kind," are the declarations used, you will observe, to describe God's

formation of the animals, in the visions both of the fifth and sixth days. The Bible is utterly opposed to Dr. Darwin's doctrine of 'Natural Selection,' in its account of the introduction of animal life, as well as of vegetable life, on the earth : it asserts that God made the *species* of animals, and also the *species* of plants : that neither came by 'Natural Selection.'

The clear, emphatic manner in which Man's existence is introduced as beginning at the close of the sixth day, by an especial act of God, must for ever separate believers in the Bible from the disciples of Evolution. *Twice* it is declared that God "made Man in His own image : in the image of God created He him." This cannot mean, nor can it be made to mean, that Man was formed out of some creature, which was formed out of one of the Anthropoid Apes, by 'Natural Selection.' It is little that is said, in this most ancient of all records, but the little that is said about Man, and God's purpose in creating him, shows that God Himself designed Man to be the crown of His earthly creation—for God gives Man dominion over it in terms which leave it impossible for us to doubt His great purpose.

Man's food, and likewise the food of the creatures who are with him, is appointed to be vegetable food, in this chapter,—for there would be no ravenous beasts or birds with him in Eden, nor would he destroy life, while he lived in innocence.

Wa-yehi erev ; wa-yehi voqer, yōm ha-shishī—“And was evening, and was morning, day sixth,” is, *finally*, the formula closing the day's vision. Man having been created towards the close of the sixth day, be it observed, could have had no seventh day, when God's seventh day began—had God's creation-days been exactly of the length of man's days—days of twenty-four hours each. The seventh day of creation must, then, have been Man's first day.

IX.

THE SEVENTH DAY: THE REST OF GOD, AND THE
REST OF MAN.

ONE of the strongest objections urged against an interpretation of the creative 'days' into *periods* is contained in the question, so often urged, "How can we keep the Sabbath as God kept it, unless the days of creation were natural days—days of the same length as our own?" The answer is, "Prove to us that the seventh day, mentioned in the second and third verses of the second chapter of Genesis, was a natural day—a day of twenty-four hours. The Divine record does not say that God's seventh day ended. It leaves us, rather, to contemplate the reason why His seventh day has not yet ended."

"I know not," reasons noble Hugh Miller, "where we shall find grounds for the belief that

the Sabbath day during which God rested was merely commensurate with one of the Sabbaths of short-lived man,—a brief period measured by a single revolution of the earth on its axis. We have not, as has been shown, a shadow of evidence that He resumed His work of creation on the morrow : the geologist finds no trace of post-Adamic creation : the theologian can tell us of none. God's Sabbath of rest may still exist, the work of redemption may be the work of His Sabbath-day. That elevatory process through successive acts of creation, which engaged him during myriads of ages, was of an ordinary week-day character ; but when the term of His moral government began, the elevatory process peculiar to it assumed the divine character of the Sabbath. This special view appears to lend peculiar emphasis to the reason embodied in the commandment. The collation of the passage with the geologic record seems, as if by a species of re-translation, to make it enunciate as its injunction, " Keep this day, not merely as a day of memorial related to a past fact, but also as a day of co-operation with God in the work of elevation, in relation both to a

present fact and a future purpose." "God keeps His Sabbath," it says, "in order that He may save : keep yours also that ye may be saved."

"But could not God have made all that you say He has made in periods, some of them at least of great length, in six of our natural days?" Undoubtedly He could have done it, but where is the proof that He has so done it? and what purpose could be answered by His having so done it? We see the evidence of gradual progress as unmistakably written by His almighty hand on the leaves of the Stone Book, as we see the evidence of His all-wise mind in the design and contrivance which marks all living Nature. "The invisible things of Him, from the creation of the world, are clearly seen, being understood by the things that are made," we reason to be a strict truth, when we mark the evidence of design in the formation of an eye. We do not think that we are deceived when we so reason. Why should we think we are deceived when we mark gradual progress in the creation-work? What purpose could be served by God's performance in a few hours of what our reason shows us must have taken long

periods of years, or ages, to bring into existence? And are not all reasonings about the length of the creation-days, after all, trifling? Is not all time relative? What seems a short time to us, now, would seem a long time if our lives were never longer than twenty years. And what seems a long time to us, would have seemed a short time to one of the antediluvians whose life fell little short of a thousand years in length. God has eternity to work in. Why should He have made the earth, and its countless and varied inhabitants, in six days, just of twenty-four hours each?

X.

CONSIDERATION OF SOME OBJECTIONS.

“WHY should we give up our long-established belief that the whole book of Genesis is an inspired revelation to Moses, and receive a mere theory that a part of it consists of documents much older than the time of Moses?—and why should we receive it as a fact, that the record in the first of Genesis is a record of Adam’s visions? It is a mere theory.”

I reply, my friend, that *your* belief is all theory. The name of Moses—or any allusion to him—is not to be found in any one of the fifty chapters of Genesis. You have no authority for saying, or believing, that the book of Genesis is “a revelation to Moses.” When you read, “And God spake unto Moses,” in the books that follow, I hold most truly that you and I have “a revela-

tion to Moses ;” but there are no such words in Genesis.

I pray you to mark how orderly, how full of exact sequence, is the sacred record, when it is declared to be “a revelation to Moses.” Now, can you persuade yourself that a legislator, a leader—we may say, of unequalled character—a man of orderly and commanding mind, would be likely to write the early history of Man in the way that several of the opening chapters of Genesis are written? Would he give a short general account of Creation—then begin his work again, and give us the history in another form—then give us beginning after beginning of fragments of history? Do the opening chapters of Genesis look like the work of *one* orderly and powerful mind, to which a special and Divine revelation has been made?

And why should any one think we are taking something valuable from him, by destroying his old persuasion that Genesis is, simply, a revelation to Moses? Is not the character of the record enhanced unspeakably in value by the belief that the opening chapters were memorials left by the first and earliest of our race—had been most sacredly

preserved—and were accounted so sacred by Moses that he accounted it his strict duty to place them, unaltered, at the head of the longer record which he intended to complete?

I beg to say one word in defence of my own theory, in reply to those who have asked me—“Why are you not content with the theory of Kurtz and Hugh Miller, that the first chapter of Genesis consists of a series of visions beheld by Moses?”

Because it leaves us in the very difficulty I have just alluded to: that of supposing that he could write in a disjointed and unorderedly manner.

But my great objection to the theory that the first of Genesis is either a revelation to Moses, or a series of the visions of Moses, is—that it abolishes the precious fact of the great salutary and sanctifying uses which the record of Adam's visions was to serve for the children of Adam and their children's children: it was to be their grand preservative against idolatry.

XI.

THE AGE OF MAN : THE BONE CAVES : THE
SUPPOSED 'FLINT IMPLEMENTS.'

LET us leave the subject which has occupied us so long, and turn to another and more modern chapter of controversy. Many geologists of high name and reputation have manifested a most eager desire to have it believed that Man has existed a great deal longer on the earth than the Bible account declares—even when the different numbers of the Hebrew text, the Samaritan Pentateuch, and the Septuagint, have been compared and digested, and set down as extending not simply to 7,000 years, but possibly to 10,000 years.

Boucher de Perthes, a French gentleman of Abbeville, may be considered as giving the start to the very wild fancies about the age of Man

on the earth which have become so common with leading geologists. He first observed in 1841 what he regarded as a flint hatchet made by human hands, among some Mammalian petrifications; and soon after found other chipped or split flints which he also believed to be the work of early men. In 1846, he published a book affirming that he had discovered *human implements* in the Drift; and in the next year he put forth another book, with drawings of the Flints. Most people looked upon him as a mere enthusiast, and did not hesitate to say he was 'cracked.' In 1859—the year of the publication of Mr. Darwin's 'Origin of Species'—Dr. Falconer went to see the collection of what M. de Perthes called his 'human implements;' and then persuaded Evans and Prestwich to go to the valley of the Somme, and give the matter their consideration. Although they were by no means very enthusiastic believers in M. de Perthes' theory, it seems that they induced Lyell, Murchison, Lubbock, and others, to follow, and examine the beds on the Somme where these 'implements' were found. The search soon began in England, and an abun-

dance of these split or chipped flints were found in the Isle of Ely, and all over the Eastern Counties, in Bedfordshire, Hampshire, and the Isle of Wight, and in Cornwall.

Be it understood, that, in all these cases, the chipped or split flints were always rough ; they were never polished. That the polished flints exhibited in our museums are of human workmanship, no man thinks of doubting ; but—except the people who deny that there is any proof of contrivance in an eye or a limb—nobody imagines it to be so very palpably and pellucidly clear that countless split flints found *in* the ground, or *on* the ground, must have been split by human hands. I must confess, my friends, that it seems to me to be one of the queerest facts ever met with, that our ‘grand top-sawyers’ in Science should insist, so valorously, that *Mind* has been employed in making what they insist on calling ‘flint implements.’ and yet they cannot discern that *Mind* is traceable in the formation of the human hand, or eye.

Mr. Whitley, a surveyor, living in the neighbourhood of Truro, and a practical geologist, has

been protesting against this *craze* of our leading geologists, for the last dozen years or more. In 1865, he issued a pamphlet exposing the false reasonings and conclusions of Sir Charles Lyell and Professor Ramsay, and others, respecting the 'Antiquity of Man,' drawn from these chipped or split flints. In 1874, he was at a meeting of the Victoria Institute in London, and in the presence of several scientific men, again exposed their mistaken conclusions; and last year, the Victoria Institute issued 'A Critical Examination of the Flints from Brixham Cavern, by N. Whitley, C.E., in which the same author has shown up the infatuation of men of science respecting the 'human implements' said to have been found in that cavern in 1858 and 1859.

Sir John Lubbock has published an imposing, big book, to establish what he fondly considers to have been the 'Palæolithic' and 'Neolithic' Ages, as well as the Bronze and Iron Ages of Man. But the American geologists are already proclaiming that they see no truth in Sir John's fanciful distinctions of 'Palæolithic' (or ancient flint) and 'Neolithic' (or modern flint) Ages of

Man. That ancient men used sharpened flints, nobody doubts. The wife of Moses, and also Joshua, used 'knives of flints' for the rite of circumcision. And we cannot wonder at this. The split flints are so numerous in the Arabian Desert, that a part of it is called 'the Desert of Flints;' and the most intelligent travellers hold that these abundant flints are split by the change of temperature. In those countries, it is often piercingly cold, when you awake in the morning; and by high noon, the fierce sun peels the skin off your face.

These split or chipped flints have not only been found by millions in our own country, but they are found in France and almost all over Europe, in India, in Australia, in Terra del Fuego, in Japan, in Palestine, in Algiers, on the great Sahara, on the Libyan desert, and "on the sterile terraces and slopes which border the Nile, but not on its alluvial soil," says Mr. Whitley. The common-sense question is, Where did all the men come from, who, according to Professor Ramsay, and Sir Charles Lyell, and Sir John Lubbock, must have lived so many thousands of

years ago, and fashioned so queerly these millions of millions of flints which nobody could imagine were fashioned at all, by man—except somebody who ‘had a soft place in their head,’ as they say in Yorkshire? . The high scientific people call these chipped flints and gravels ‘arrow-heads and spear-heads and knives ;’ but when you look at many of them, you cannot help thinking that these same high scientific people must have very strange notions of tools.

One of the most conclusive facts that have been brought to bear against the truth of this wild theory of the Flints, is—that when they are put into a stone-breaker, the flints come out of the very forms and shapes which our geological Solomons call ‘knives, and spear-heads and arrow-heads.’ Mr. Whitley has shown this. “A flake,” says he, “is the result of the natural fracture of the flint, and a nodule of flint mechanically crushed by a stone-breaker produces as perfect flakes as are now referred to human workmanship.”

When Keltic tumuli are opened, it is usual to find some chipped flints with the rude bronze tools and pottery which accompany human remains.

No one can doubt that ancient men made some use of split flints ; but to assert that wherever the split flints are found there men must have lived, is "quite another thing," as we say. Why are not petrifications of the men found with the millions of flints, if men *did* split and chip them ? They have been collecting these flints, and raving about them, for years ; but no human petrification can be found among them—although a *new* human jaw, placed among the gravel by a grave-digger, deceived one French enthusiast, in a ludicrous way.

Nor does the discovery of the human relics at Engis, or Cro-Magnon, or Mentone, aid the high scientific people in their attempt to discredit the Bible account of the late introduction of Man, by the Creator. Although they will have it that these relics have been found in sites which prove a high antiquity, nobody asserts that the skulls show we are closely related to apes. Huxley himself says the Engis skull might have been the skull of a philosopher ; and the other skulls are very large, and the parts of skeletons found with them show that the skulls must have been worn on the shoulders of men more than six feet high. This

cannot surprise us. The Bible assures us that men of great stature lived in ancient times. Principal Dawson contends that these may be relics of antediluvian men.

Let it be observed, too, that so far from the finding of a few chipped flints in caverns, along with parts of the bones of the Mammoth, proving a great antiquity,—the finding of a score, or one hundred, perfect petrifications of men, in the same situation, ought not to lead us into the mistaken conclusion that *therefore* the human petrifications must have lain there several thousand years. I am talking to-night in the hearing, doubtless, of many general readers, and some of you must be amiliar with a fact which has been mentioned, again and again, in various publications. The body of a mammoth entire was reported to have been seen by an English traveller, at the close of the last century, on the fall of a mass of ice, on the banks of the Lena, in Siberia. Mr. Adams, in 1803, went and found the mammoth. Part of its body had been devoured by wolves, and the Yakut hunters, who showed him the skeleton, informed him that they had given some of the flesh to their

dogs. Such of its skin as remained was covered with black bristles, thicker than horse-hair, with a warm covering, underneath, of reddish wool and hair. The skeleton of this animal is now in the St. Petersburg museum.

Now I appeal to your common sense,—Can you believe that wolves and dogs could eat flesh which had been enclosed in ice for several thousand years? Can you believe they could eat it, if it had been so enclosed one thousand years? I confess to you that *I cannot*. My humble conclusion is that mammoths were existing in Siberia *not* one thousand years ago. Pallas, the great traveller, obtained the body of a rhinoceros which had been frozen up in the same manner. And when the mass of thick hair was seen on the head and foot, which were taken also to St. Petersburg, the beholders said it must have lived in Siberia, by its clothing. I should say that some of these huge animals not only lived there—being fitted by the Almighty Maker for the climate—but it is not so very long ago that they lived there.

There has, no doubt, been a most eager and uneasy snatching at every straw which they ima-

gined would support their long-age-of-man theory, by leading geologists ; but they are, ever and anon, found to be *only* straws, and no real supports. The fibula of a man, which, it was triumphantly proclaimed, had been found in the Victoria Cave, near Settle, is now declared to be part of the leg bone of a bear ! And so it has been with other judgments pronounced in haste, at the dictate of the will, and not of reason.

It is affirmed that the late creation of Man, recorded in the Bible, does not afford time enough for the growth of such civilisations as those of the ancient Egyptians and Assyrians. I have not time to go into such a question now ; but I humbly think, if you make the due inquiry for yourselves, you will not come to that conclusion.

XII.

HAECKEL'S PEDIGREE OF MAN : WEAKNESS AND
FOLLY OF THE DOCTRINE OF EVOLUTION.

WE must not merely consider Evolution as the *Ape*-theory of Man's origin—for Professor Haeckel, the leading Evolutionist of Germany, gives us our animal pedigree of *twenty-two* stages.

(1) *Anthropoi*, or men, were evolved from the (2) *Pithecanthropoi*, or dumb ape-men; and they from the (3) *Anthropoides*, or man-like apes (gorilla, orang-outang, chimpanzee, etc.); and they from the (4) *Menocerca*, or tailed apes, or monkeys; and they from the (5) *Prosimiæ*, or half-apes (Indris and Loris); and they from the (6) *Marsupialia*, or kangaroos; and they from the (7) *Pro-Mammalia* (the duck-billed Platypus and Echidna); and they from the (8) *Protamniota*,—

("What they were like, I do not suppose any one is in a position to say!" says Huxley); and they from the (9) *Sozura*, or half Amphibia; and they from the (10) true Amphibia; and they from the (11) *Dipneusta*, or Lepidosirens; and they from the (12) *Selachii*, or Sharks.

"Mercy on us!" exclaims some one, "does the man mean to tell us that we come out of sharks?"

"And what if he does?" cries another; "are not some of us held to be sharks, still? Are not the lawyers called sharks?"

"Why, yes," says another, "but then, you know, they are land-sharks, and Haeckel means water-sharks!"

"And what were the sharks developed from, please?"

Oh, from the (13) *Monorhina*, or Lampreys; and they from the (14) *Acrania* (represented by the *Amphioxus*); and they from the (15) *Chordonia*——

"Never heard of such a creature!" cries some one.

No—nor was it ever heard of, till Haeckel said it *must* have existed—for the Ascidian *must*

have come out of it, and the Ascidian *must be* 'one of our ancestors'!

"And what did the *Chordonia* come out of, by Evolution, or Development?"

From the (16) *Solecida* (some kind of Annelida, or worms); and they from the (17) *Archelminthes*, or Turbellaria; and they from the (18) *Gastræa* (another imaginary creature, like the *Chordonia*); and they from the (19) *Planæada*, or ciliated animalculæ; and they from the (20) compound *Amæbæ*; and they from the (21) Simple *Amæbæ*; and they from the (22) *Moneron*—

"And what's that, sir?" says some one.

Haeckel says that it is an 'albuminous compound of carbon,' and the earliest form of life;—that it begun to live in the Laurentian strata, by spontaneous generation; and that its acceptance as our *earliest ancestor* is necessary 'on the most weighty general grounds'!

"Have any petrifications of the *Pithecanthropoi*, or dumb ape-men, ever been found?" some of you will ask.

No; but Haeckel sagely conjectures they *will* be found *some day*, in Africa, or Southern Asia—

although he also conjectures that they dwelt chiefly in *Lemuria*, a continent which is now sunk—he again conjectures—in the Indian ocean !

If such be modern philosophy, am I wrong in calling it philosophy-run-mad ?

Mr. Darwin, and the rest, seem very meekly to accept all this monstrous nonsense from the mighty Haeckel ; and Mr. Darwin also conjures us to *respect our ancestors* !

But are they coming after us ?—we cannot help asking Mr. Darwin and his grand compeers in ‘*science*.’ If Evolution be true, though the dumb ape-men are no more, we ought to behold some progress upwards in the race next below them. What progress are they making—the Gorilla, and Ourang, and Chimpanzee ? Do they approach towards our human civilisation ? Where are their houses—their towns—their cities ? Where are their ships—their bridges—their railways ? Where are their books—their libraries—their picture and sculpture galleries ? Where are their arts and sciences ? Which of the animals have they tamed and domesticated ?

How dreary the answer ! “They all remain in

their savagery, still!" One would think it should silence these wild philosophers. But when men set themselves to maintain a theory, how often do we see that they are not moved even by what they themselves confess to be the strongest disproofs of their theory. It is a well-known fact that animals of different species do not breed together; or if, as in the instance of the horse and ass, a hybrid (the mule) is produced, the hybrids will not breed. So long as this remains a fact, says Professor Huxley, so long Mr. Darwin's theory can only remain *a theory*! And yet Professor Huxley proclaims himself an Evolutionist!

Historic time has given us no proof of Evolution. Yonder, in old Egypt, are the pictures of the camel, and the crocodile, and the hippopotamus, and the ape and monkey, and other creatures,—with the mummies of the ox, and cat, and ibis,—and all show that there has been no evolution in the instance of any of these animals, in several thousand years. This was a fact on which the illustrious Cuvier was wont to insist very strongly, in his rejection of the Lamarckian doctrines.

And who, that thinks of the old Greeks, can

assert there has been any evolution for Man? We are neither so fine a people physically, nor in intelligence. When you remember their poetry, and think of their Homer, and Æschylus, and Sophocles, and a long list beside; when you think of their philosophy, and remember their Plato and Aristotle, and a countless host of other names; when you think of the art of government, and remember their almost perfect Pericles; when you think of patriotism, and remember their Leonidas and hundreds of other heroes; when you think of their marvellous sculpture, and remember that no modern nation has ever approached it in excellence; when you think of the perfect beauty of their language,—who can fail to pronounce the old Greeks the most matchless people that ever yet existed? You will say, we know more than they knew. Just so; because we reap the knowledge and the fruits of the experience of ages. But we are not the equals of the old Greeks, as a people, for all that.

There are some signs of this whimsical theory of Evolution soon taking another phase. Carl Vogt has given hints that perhaps they have, after

all, made a mistake as to the *line of descent*. It may be found, he conjectures, that Man is *not* descended from the Ape family, but from the Dog!

Other theories may soon be heard of—for the human mind is restless under the burthen of mystery. Mystery seals up many a page of the Bible to us, in this our imperfect state; and mystery surrounds us on every side in nature. The mystery of our own existence—of the existence of our race—the mystery of life—is felt to be intolerable to some men. They are unwilling to receive the doctrine of Creation by an Almighty Maker as a solution. “You only answer us by another mystery,” they exclaim; “Creation by an Almighty Maker is a mystery,” or, as Herbert Spencer says, it is *unthinkable*.

If by *unthinkable* he means incomprehensible, our reply is—So it is in millions of cases: we really comprehend nothing; and there are thousands of facts we never dream of comprehending. We shall never be able to comprehend *how God creates*. We can only think of creation as the act of Almighty Will. The highest archangel can no

more comprehend it than we. If God exists, He must be able to create : that is the beginning and the end of it.

You and I are believers in God's existence ; and so we do not seek to pry into His method of creation. The design and contrivance we discern in Nature prove His wisdom to us. His endowment of His creature Man, with attributes so superior to the limited powers of brutes, renders us unwilling to listen, either to the doctrine that we are developed from the brutes, or the dark doctrines of Materialism and Annihilation, which are held, also, by our modern philosophers.

We thank God that we are Christian men, and, turning from the degrading proclamation of the professedly wise men, that we are born of the brutes, and shall perish like them, and be no more for ever—we listen to the glorious words, “I am the Resurrection and the Life. He that believeth in me, though he were dead, yet shall he live. And he that liveth and believeth in me, shall never die.”



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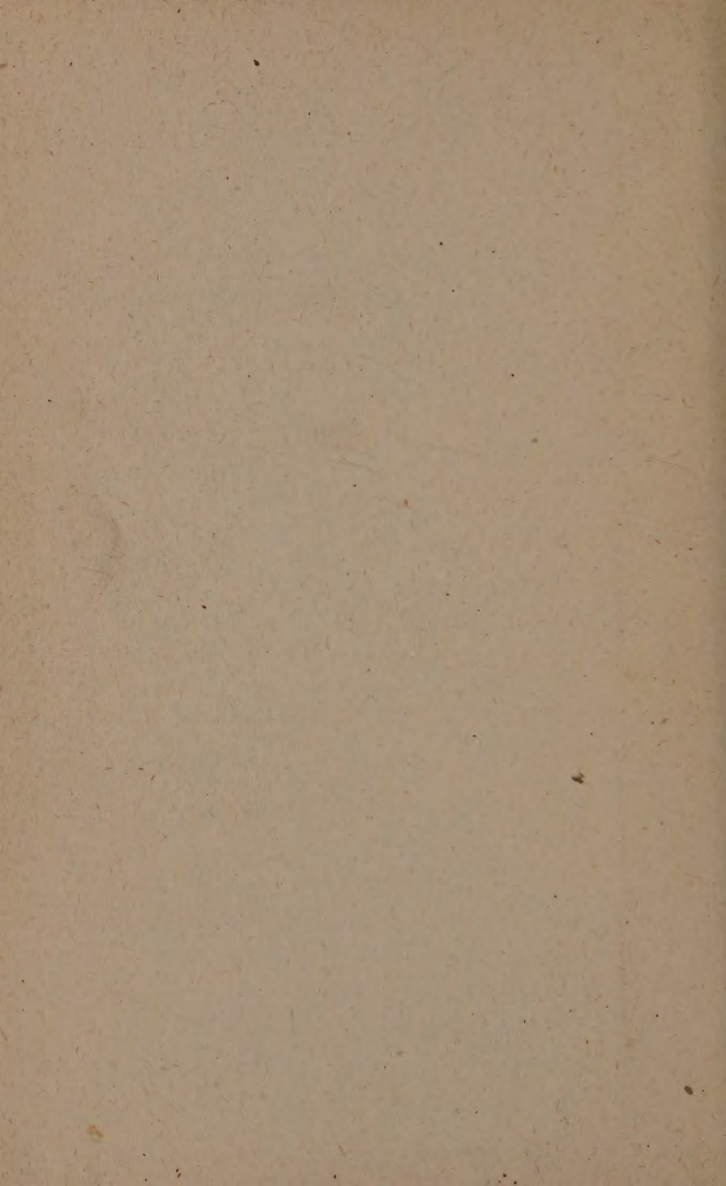
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